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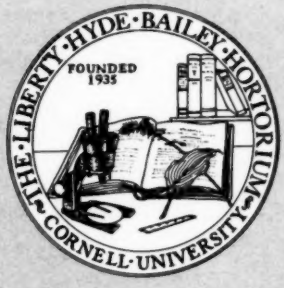

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Studies in the Cultivated Boraginaceae
4. A Key to the Genera

John Ingram

Constructing a simple usable key to include all cultivated genera of the cosmopolitan family Boraginaceae offered in American horticulture, a key which can be used easily by the non-botanist, is not an easy achievement, and perhaps even an impossibility. An attempt at such a key is made here, and since it admits only specified groups of cultivated taxa, there is the existing possibility that every described species in a given genus may not be identifiable to its proper genus. In order to keep the key as simple as possible, an endeavor has been made to employ obvious features and to illustrate technical points of morphology; however, everything cannot be simplified and several obstacles are apparent.

Probably the most frustrating situation confronting the person trying to key out a particular specimen is that the flowers of most of the genera have a tendency toward being rather small. So often when one begins so eagerly the task of identifying an unknown, relying on the naked eye or having only a hand lens at one's disposal, one gives up in disgust even before getting the flower dissected. It is often necessary to explore the inside of the corolla for particular morphological structures before one can make a definite determination of an unknown. Before we condemn the family, it is well to remember that the charm of many of its members lies in their bright masses of little flowers.

Another stumbling block to the study of borages is the emphasis placed by botanists on the morphology of the fruit, a matter which must be dealt with since it is fundamental to basic classification in the family; it is impossible to identify certain taxa unless one can study the mature fruit. Except for Cordia, Bourreria, and Ehretia, the genera included in the key have their mature fruit composed of 1 to 4 nutlets. Unfortunately, there are a few difficult genera whose nutlets are either tiny or for which one must examine the internal face of a nutlet, but for the most part the nutlets can be observed with a hand lens if mature fruits are available.

Several genera of the Boraginaceae are frequently cultivated in rock gardens or in the border. Most of these have a characteristic inflorescence usually referred to in botanical literature as a heli-

Fig. 1. Mertensia paniculata: a, habit; b, terminal portion of a cincinnus x 4/5; c, flower x 2 1/2.

coid cyme. A curious singularity of this inflorescence is that it is coiled at the tip and unrolls as it matures, insuring a blooming period lasting over many days and sometimes weeks. Unless one is hasty in ridding one's garden of older plants, it will doubtless be possible to locate, with little effort, a complete specimen necessary for identification, since, besides flowers, there will generally be mature fruits at the lower nodes of the older inflorescences.

The first three genera are not what gardeners in northern parts of the United States would recognize as typical borages; however, it is conceivable that residents of warmer areas of the South might be more familiar with cordias than with forget-me-nots. Cordia, Bourreria, and Ehretia are all genera of shrubs or trees and their fruits are either drupes or nuts. They are native in the tropics or subtropics. Heliotropium may be shrubby or herbaceous, but in total aspect resembles the remaining genera, which are mainly annuals or herbaceous perennials.

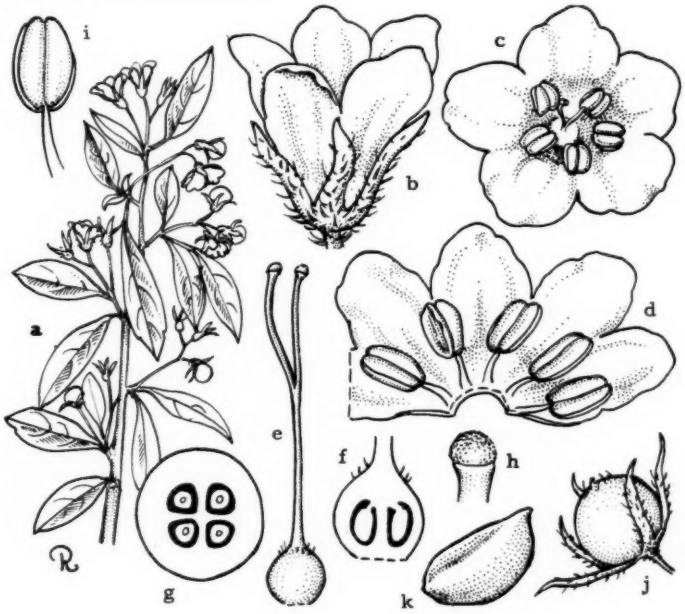


Fig. 2. Ehretia microphylla: a, flowering branch x 4/5; b, flower, side view x 5; c, flower, face-view x 5; d, corolla expanded x 5; e, pistil x 9 1/2; f, ovary in vertical section x 16; g, ovary in cross section x 9 1/2; h, stigma x 32; i, stamen x 6 1/2; j, fruit x 3; k, seed x 8.

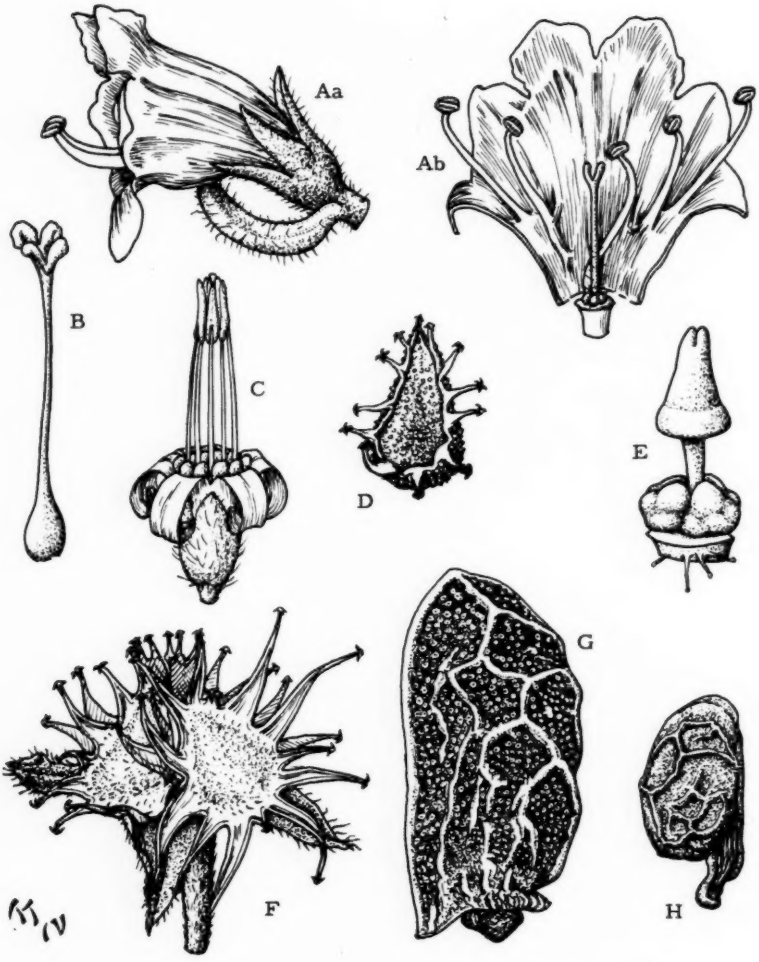


Fig. 3. A, Echium plantagineum: a, flower x 2; b, corolla expanded, with pistil x 2. B, Cordia Sebestena, pistil x 3. C, Trachystemon orientale, flower x 3. D, Lappula Redowskii, nutlet x 8. E, Heliotropium arborescens, pistil x 16. F, Hackelia Jessicae, fruit x 8. G, Anchusa azurea, nutlet x 8. H, Pentaglottis sempervirens, nutlet x 8.

For most gardeners, the latter part of the key will include the more familiar taxa such as alkanet, borage, bluebells, Chinese forget-me-not, comfrey, forget-me-not, and lungwort. Certain western-American Boraginaceae belonging to the native genera Lappula, Hackelia, Cryptantha, and Plagiobothrys have been slowly finding their way into cultivation. Many of these are likely to be only transient and will never become the ubiquitous garden plant that the forget-me-not is; however, if they are given the proper environment and setting, they can be cultivated effectively.

Key to the Genera of the Cultivated Boraginaceae

1. Ovary undivided or only lobed, the style terminal.
   2. Styles branched, stigmas 2 or 4; fruit a drupe or a nut.
      3. Style twice bifid, each of the 4 branches bearing a stigma (Fig. 3B). . . . . Cordia
      3. Style bifid, each of the 2 branches bearing a stigma (Fig. 2e).
         4. Calyx closed in the bud stage, 2- 5-lobed in anthesis. . . Bourreria
         4. Calyx not closed in the bud stage, 5-parted in anthesis. . . Ehretia
   2. Style entire, with a single stigma (Fig. 3E); fruit of 4 nutlets. . Heliotropium
1. Ovary divided into 4 parts which become nutlets in fruit; style simple or seldom 2- or 4-lobed, standing in the center between the lobes of the ovary.
   5. Flowers zygomorphic (Fig. 3Aa, Ab). . . . . Echium
   5. Flowers actinomorphic.
      6. Corolla-throat bearing crests of scales.
         7. Nutlets bearing spines or barbed bristles (Figs. 3D, 5j, 7j).
            8. Nutlets erect (Fig. 3F).
               9. Plants annual; pedicels erect in fruit. . . . . Lappula
               9. Plants perennial; pedicels reflexed in fruit. . . . . Hackelia
            8. Nutlets spreading (Figs. 4h, 5i, 7i).
               10. Stamens long-exserted from the corolla, the filaments attached below the sinuses of the corolla-lobes, but above the crests (Fig. 4d). . . . . Solenanthus
               10. Stamens included within the corolla, or if ever exserted from it, the filaments attached at the same level as the crests or below them (Figs. 5e, 7d).
                  11. Upper surface of the nutlet concave. . . . Adelocaryum
                  11. Upper surface of the nutlet flat or convex even though margined by a wing.
                     12. Spines on the nutlets of two sizes, the ones on the margin much larger. . . . . Lindelofia
                     12. Spines on the nutlets all about the same size and evenly distributed over the outer surface of the nutlet. . . . . Cynoglossum

7. Nutlets not bearing spines or barbed bristles, either smooth or rough (sometimes hairy in Omphalodes).

13. Anthers erect and connivent into a cone, appendaged on the back (Fig. 8c). . . . . Borago

13. Anthers not connivent into a cone nor appendaged on the back.

14. Stamens long-exserted from the corolla; corolla-lobes reflexed (Fig. 3C). . . . . Trachystemon

14. Stamens included within the corolla; corolla-lobes erect or spreading.

15. Leaves ovate-cordate, to 30 cm. long and 13 cm. wide, glabrous, succulent, glossy; flowers in a corymbose cyme. . . . . Myostidium

15. Leaves linear to ovate, conspicuously hairy; inflorescence loose.

16. Flowers subtended by bracts.

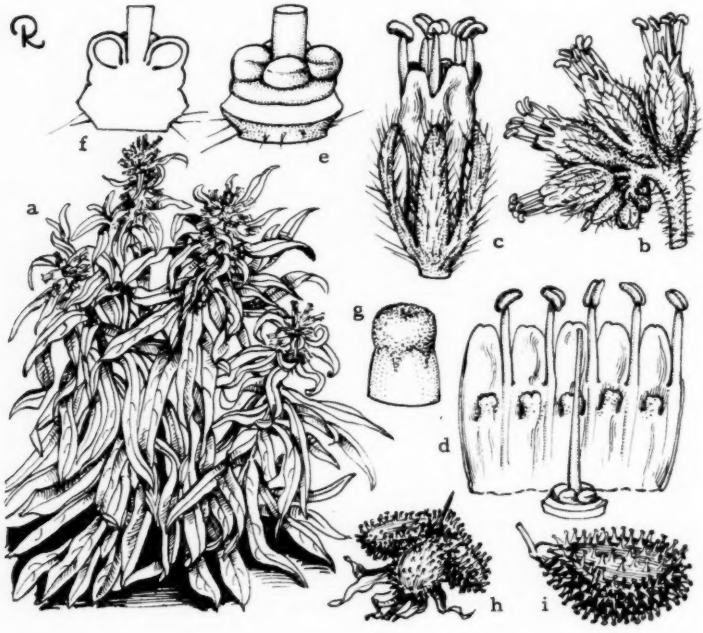


Fig. 4. Solenanthus apenninus: a, habit; b, a cincinnus x 1 1/2; c, flower x 3; d, corolla expanded, with pistil x 3; e, base of pistil x 8; f, same in vertical section x 8; g, stigma x 32; h, fruit x 1 1/4; i, nutlet x 2 1/2.

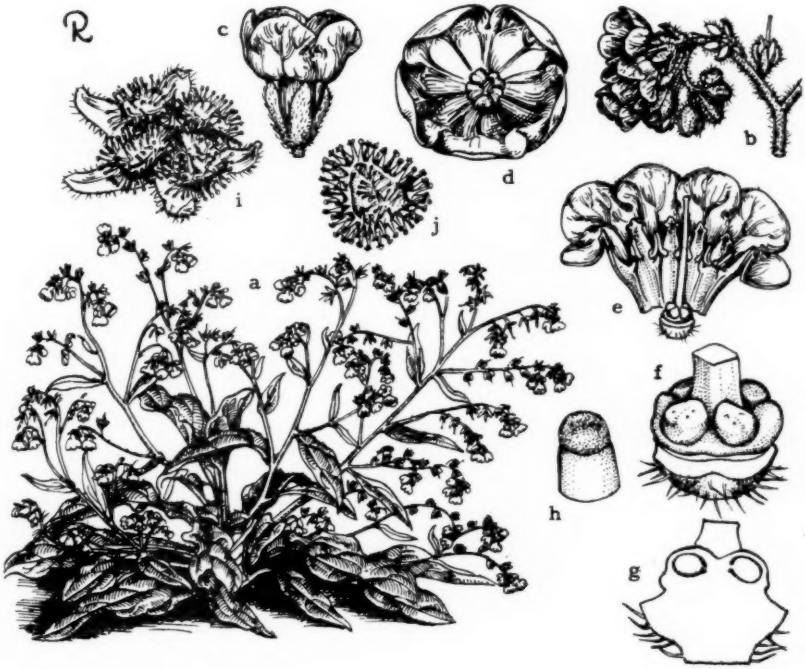


Fig. 5. Adelocaryum anchusoides: a, habit; b, a cincinnus x 4/5; c, flower x 1/2; d, same, face-view x 2 1/2; e, corolla expanded, with pistil x 1 1/2; f, base of pistil x 8; g, same in vertical section x 8; h, stigma x 24; i, fruit x 1 1/2; j, nutlet x 2 1/2.

17. Flowers white, blue, or pink; nutlets dull, rough or smooth, never porcelain-like.
    18. Nutlet with a basal tumid ring, and sometimes stalked (Fig. 3G, H).
        19. Leaves lanceolate to oblong, obscurely veined; nutlets sessile and broad. (Fig. 3G). . . . . Anchusa
        19. Leaves definitely ovate, the lower leaves long-petioled, prominently veined; nutlets stalked (Fig. 3H). . . . . Pentaglottis
    18. Nutlet lacking a basal tumid ring, sessile (Fig. 6B, F).
        20. Flowers blue. . . . . Eritrichium
        20. Flowers white. . . . . Cryptantha
17. Flowers yellow to yellow-orange, or rarely white or white with yellow crests; nutlets white, smooth, shining and porcelain-like. . . Lithospermum

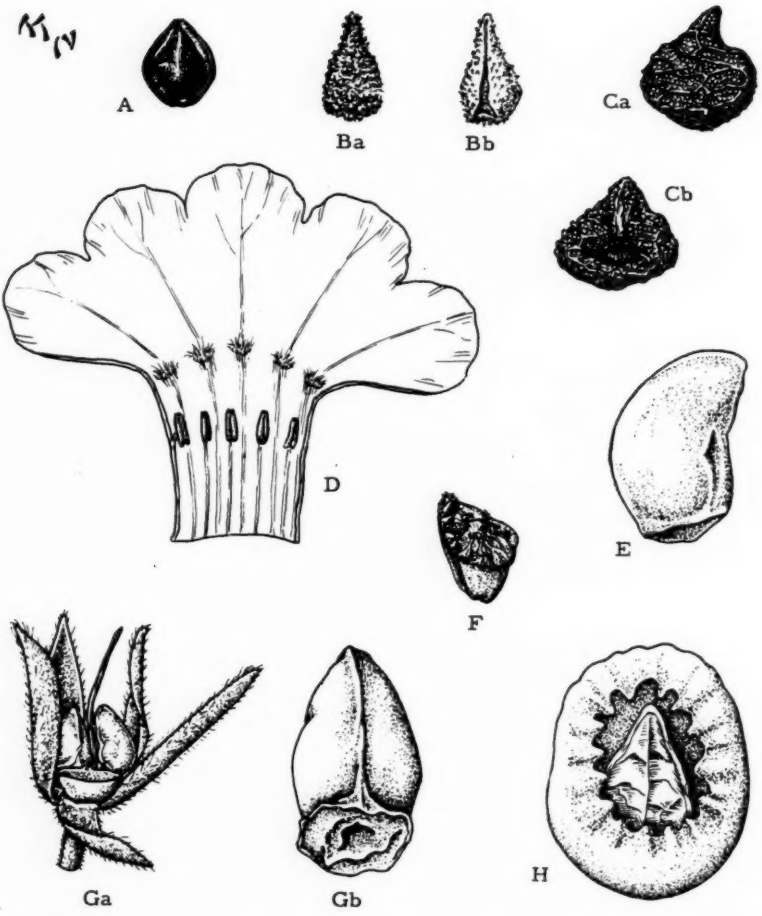


Fig. 6. A, Myosotis sylvatica, nutlet x 8. B, Cryptantha intermedia: a, nutlet, dorsal view x 8; b, same, ventral view x 8. C, Plagiobothrys nothofulvus: a, nutlet, dorsal view x 8; b, same, ventral view x 8. D, Pulmonaria saccharata, corolla expanded x 3. E, Moltkia Doerfleri, nutlet x 8. F, Eritrichium elongatum, nutlet x 8. G, Lithodora fruticosa: a, fruit, showing persisting basal portion of one nutlet after latter's abscision x 3; b, ventral view of nutlet x 8. H, Omphalodes linifolia, dorsal view of nutlet x 8.

16. Flowers not subtended by bracts, but 1 or 2 bracts occasionally present at the base of the inflorescence.

    20. Nutlets essentially horizontal, with smooth or toothed border which turns inward and upward, the whole nutlet resembling an umbilicus (Fig. 6H). . . . . Omphalodes

    20. Nutlets erect, unbordered, or with an apical border in Eritrichium (Fig. 6F).

        21. Plants depressed, tufted, and mat-forming through the formation of many short, slow-growing stems with crowded leaves. . . . . Eritrichium

        21. Plants erect, not mat-forming; leaves obviously not crowded together on the stem.

            22. Corolla tubular to campanulate, abruptly expanded in the throat, the lobes erect or essentially so. . . . . Mertensia

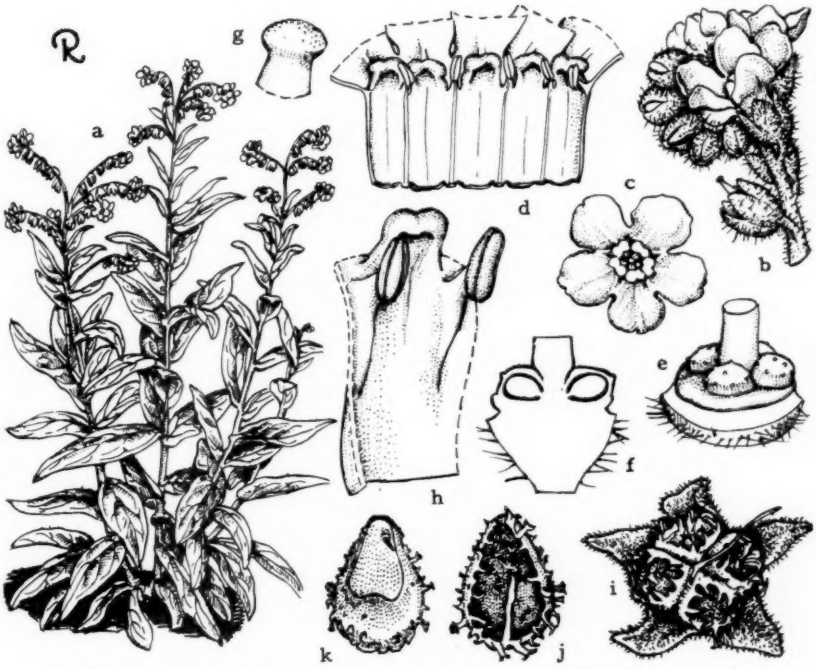


Fig. 7. Lindelofia longiflora: a, habit; b, terminal portion of a cincinnus x 1 1/2; c, face-view of flower x 1 1/2; d, corolla expanded x 3 1/4; e, base of pistil x 9 1/2; f, same in vert. sect. x 9 1/2; g, stigma x 32; h, portion of interior of corolla tube, with two stamens and one scale of crest x 6 1/2; i, fruit x 3 1/4; j, nutlet, dorsal view x 5; k, same, ventral view x 5.

22. Corolla funnelform or salverform, the throat not abruptly expanded, the lobes rotately spreading.

    23. Basal leaves ovate, cordate to reniform at the base, the blade to 15 cm. long and 18 cm. wide, on petioles to 20 cm. long; nutlets with a tumid, annular ring at the base. . . . . .Brunnera

    23. Basal leaves lanceolate to oblanceolate, the base tapering to the petiole; nutlets lacking a tumid, annular ring.

        24. Flowers usually blue with yellow or white crests, rarely pink, white, or yellow; mature nutlets polished and shining, often black, attached at their bases to the flat receptacle (Fig. 6A). . . . . Myosotis

        24. Flowers white, sometimes white with yellow crests (none of the yellow-flowered species of Cryptantha is cultivated); nutlets usually rough, often muricate or papillate, attached above the base, or from the base to the middle.

            25. Nutlets attached along a slit or ventral groove (Fig. 6Bb). . . . . Cryptantha

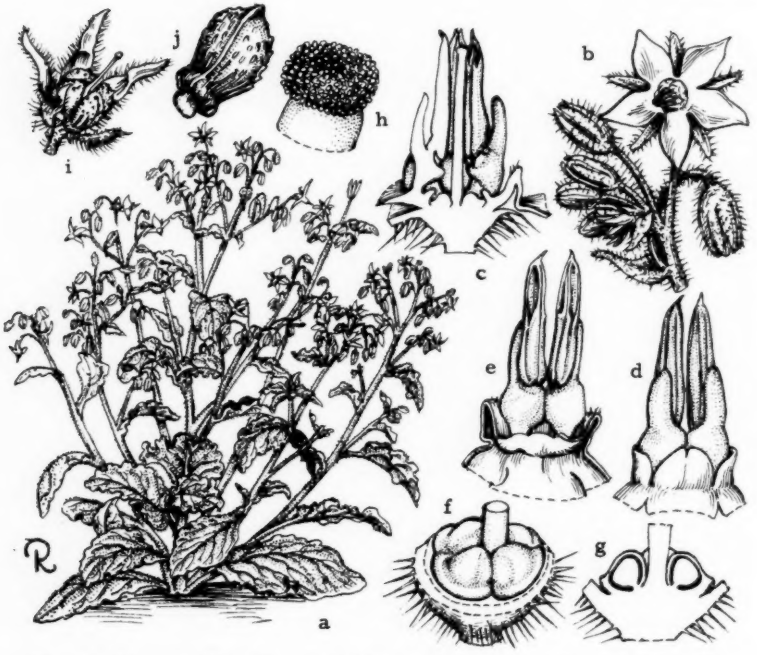


Fig. 8. Borago officinalis: a, habit; b, cincinnus x 4/5; c, flower in vert. sect. (most of corolla and calyx removed) x 3; d, crest-scales and two stamens, dorsal view x 3; e, same, ventral view x 3; f, base of pistil x 6 1/2; g, same in vert. sect. x 3; h, stigma x 20; i, fruit x 1 1/2; j, nutlet x 3.

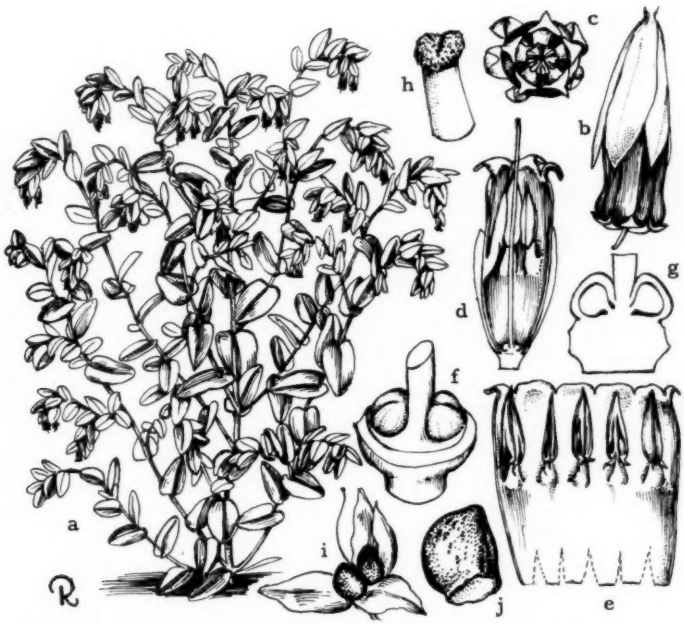


Fig. 9. Cerinthe major: a, habit; b, flower, side view x 1 1/2; c, same, face-view, showing anthers connivent x 1 1/2; f, base of pistil x 8; g, same in vert. sect. x 8; h, stigma x 16; i, fruit x 4/5; j, nutlet x 2 1/2.

25. Nutlets lacking a ventral slit or groove, but the slit or groove replaced by an elevated keel and a conspicuous scar where the nutlet was attached to the gynobase (Fig. 6Cb). . . . . Plagiobothrys

6. Corolla-throat devoid of crest or scales but sometimes bearing glands or hairs; these may be in tufts, in lines, or even scattered.

26. Corolla-throat bearing 5 tufts of hairs (Fig. 6D). . . . . Pulmonaria

26. Corolla-throat with 5 lines of hairs or glands, or naked or with scattered hairs.

27. Each flower not subtended by a bract, sometimes a large bract or leaf present at base of inflorescence. . . . . Mertensia

27. Each flower subtended by a bract.

28. Corolla-throat bearing 5 lines of hairs or glands. . Buglossoides

28. Corolla-throat devoid of hairs or, if hairy, the hairs not localized in patches.

29. Nutlets circumscissle above the base, falling away and leaving the short basal portion persisting as a cup-shaped appendage (Fig. 6 Ga, Gb). . . . . Lithodora

29. Nutlets with basal dehiscence.
    30. Stamens inserted at different levels in the corolla-throat.
        31. Stigmas 4. . . . . Arnebia
        31. Stigmas 2. . . . . Echioides
    30. Stamens inserted in a single whorl in the corolla-throat.
        32. Anthers deeply sagittate, connivent into a cone (Fig. 9c, e).
            33. Stems glabrous; leaves glaucous, glabrous, the margin sometimes ciliate. . . . . Cerinthe
            33. Stems and leaves densely hairy. . . . . Onosma
        32. Anthers not or scarcely sagittate, not connivent into a cone.
            34. Corolla purple, blue, blue with white eye, or white (an uncultivated species, Moltkia aurea, has yellow flowers); nutlets distinctly bent at or near the middle (Fig. 6E). . Moltkia
            34. Corolla yellow, yellow-orange, or white with a yellow eye (an uncultivated species, L. Hancockiana, has bluish to purplish flowers); nutlets erect. . . . . Lithospermum

A QUARTERLY JOURNAL, "AUSTRALIAN PLANTS"

The December, 1960 (Vol. 1, No. 5 - 24 pages) issue of a new journal has recently been received at the Hortorium, a journal which will no doubt be of particular interest to horticulturists on the West Coast and perhaps in Florida and the Gulf States. This is "Australian Plants," published in Australia by the Society for Growing Australian Plants. Its purpose is "to further understanding and appreciation" of the Australian flora and "to aid its preservation by conservation in reserves and in the wild and by cultivation in home gardens...." It is a nontechnical publication, concerned with the description, botany, culture, and propagation of native plants, and illustrated with black-and-white and some colored figures. Subscription price is $1.50 per year, for 4 issues. Mail should be addressed to the Editor, 250 Picnic Point Road, Picnic Point, N.S.W., Australia.

For the benefit of Baileya readers, and with the kind permission of the Editor, Mr. W. H. Payne, we reproduce here a short list of Australian native plant seedsmen, from the December, 1960, issue. Those making inquiries or ordering from these seedsmen are requested to mention "Australian Plants."

Andersons Seeds Ltd., 90 Parramatta Road, Summer Hill, N.S.W.

Nindethana, Box 5, Dripstone, N.S.W. For all native seed; packets, ounce, or pound lots. List on application.

P. J. Parry, "Floraland," Kariong via Gosford, N.S.W. Native plant seed.

Western Wildlife Supply, Gilgandra, N.S.W. Bulk supplies of natives and exotic tree and shrub seed to the trade.

Arthur Yates & Co. Pty. Ltd., 90-100 Sussex Street, Sydney.

The Genus Aploleia (Commelinaceae)

Harold E. Moore, Jr.

During the autumn of 1959, I found a colony of a then sterile plant growing on rocky ledges below Chapulhuacán, state of Hidalgo, Mexico, which superficially appeared to be Callisia. Cuttings were forwarded to Cornell University (as Moore 8045) where they multiplied rapidly in a hanging basket and flowered in early March, 1960 and again in February, 1961. These plants represent a species here called Aploleia monandra. They, plus a more satisfactory understanding of Aneilema and Murdannia, as clarified by Brenan in Kew Bulletin 1952: 180, provide the solution to a problem that was considered but not solved in an earlier article. The opportunity to collect living material was provided by grant no. 2596 from the Penrose Fund of the American Philosophical Society, to which I am much indebted.

In Baileya 6: 138, 1958, three species were excluded from the genus Callisia. Two of these, C. monandra and C. multiflora, had already been set apart by Pichon (Notulae Systematicae 12(3-4): 225. 1946) in a new genus, Leptocallisia, which I tentatively accepted but incorrectly thought related to Aneilema as interpreted by Woodson (Annals of the Missouri Botanical Garden 29: 146. 1942) because of my own faulty interpretation of the structure of the inflorescence. This, from dissection of dried material, appeared to be composed of solitary rather than paired cincinni. Study of living material clearly shows what dried material seldom does - that the cincinni are indeed paired. I wronged the late M. Pichon who was quite correct in stating that the cincinni are paired in Leptocallisia. Leptocallisia is not closely related to Aneilema nor can the species be referred satisfactorily to any other genus of the Commelinaceae. But Leptocallisia must give way to another generic name, for Rafinesque, in 1837, had based Aploleia upon the same species that Pichon designated as type of Leptocallisia. Oddly, both Rafinesque and Pichon used illegitimate names for the type-species of their genera. Rafinesque based Aploleia on Tradescantia monandra Swartz but renamed the species Aploleia diffusa. Pichon listed Tradescantia monandra as a synonym and took up a later epithet for Leptocallisia umbellulata.

Neither species of Aploleia is currently offered for sale in the United States but both are apparently cultivated in Europe (Parey's Blumengärtnerei, ed. 2, 1: 219. 1958). Aploleia monandra has only the rich emerald-green of its foliage and its rapid growth to recommend it; A. multiflora, with its larger white flowers scented of violets, is more ornamental. The genus is strictly American in Mexico, Central America, and the Caribbean region to northern South America.

Aploleia Rafinesque, Flora Telluriana 2: 17. 1837 ("1836").

Type: A. diffusa Rafinesque, illegitimate name [=A. monandra (Swartz) H. E. Moore].

Callisia section Leptocallisia Bentham & Hooker f., Genera Plantarum 3: 854. 1883.

Leptocallisia (Bentham & Hooker f.) Pichon, Notulae Systematicae 12(3-4): 225, 237. 1946.

Type: L. umbellulata (Lamarck) Pichon, illegitimate name [=Aploleia monandra].

Stems repent or ascending, much-branched, with vegetative branches, at least in A. monandra, penetrating the sheaths at the nodes. Leaves alternate, ovate to lanceolate-ovate. Inflorescences terminal on the stems, composed of many sessile paired bracteate cincinni from the axils of leaves and of reduced leaves or sheaths on axillary branches. Flowers prominently pedicellate, bracteolate; sepals 2-3, herbaceous; petals 2-3, deliquescent; stamens 1-3 in A. monandra, 3 in A. multiflora, opposite the sepals, the filaments glabrous, distinct, erect, anthers ovate in bud, linear when dehisced, subsagittate basally and at anthesis bifid at the apex, the connective very narrow; ovary 2-3-locular with 2 ovules uniseriate in each locule, the style very short, the stigma penicilliform.

Fruit is a loculicidal 2-3-valved capsule with usually 2 striate seeds in each locule, the hilum punctiform, the embryostega dorsal. The basic chromosome number: x = 7.

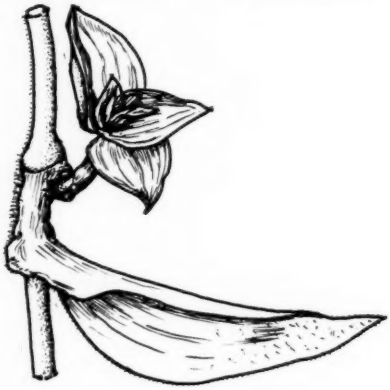


Fig. 10. A monandra. Detail showing emergence of vegetative branch through sheath of hanging stem x 2.

Aploleia is a genus of the Tradescantieae as defined by Woodson (op. cit.) by virtue of the paired cincinni (Fig. 12b), but differs from related genera in the structure of the androecium, a character rightly accented by Pichon in his work on the family. Regardless of the difficulty of working with herbarium material, the important modifications of the androecium are of paramount importance in this family. The stamens in Aploleia vary from one to three in number (even in flowers of a single cincinnus of A. monandra) but are always opposite the sepals. Elsewhere in this alliance, if the number of stamens is reduced, then the stamens are opposite the petals as in some flowers of Callisia repens and in C. insignis. Aploleia most closely resembles Tripogandra, differing conspicuously in the absence of the inner whorl of stamens. Though possibly derived with Tripogandra from a common stock, Aploleia further differs in characters of the seed, in the diffusely branched inflorescence, inconspicuous self-compatible flowers, stigma, and basic chromosome no. (x = 7). To include it within Tripogandra (excluding T. floribunda, T. rosea and allies, and T. Warszewicziana) would destroy an apparently natural genus remarkable for the adaptation of the inner whorl of stamens and uniform, so far as known, in characters of inflorescence, gynoecium, seed, and basic chromosome number (x = 8). Evolution and relationships within the Commelinaceae seem best expressed when Aploleia is maintained as a distinct genus.

Key to the Species

1. Ovary trilocular; stamens always 3; flowers scented of violets; glands of hairs on the pedicels opaque; stigma 3-lobed, at least when fresh. . . . . A. multiflora

1. Ovary usually bilocular, more rarely trilocular; stamens 1-3 in flowers of a single cincinnus; flowers odorless; glands of hairs on pedicels translucent; stigma not 3-lobed when fresh. . . . . A. monandra

Aploleia multiflora (Martens & Galeotti) H. E. Moore, tr. nov.

Commelina multiflora Martens & Galeotti, Bulletins de l'Academie Royale des Sciences et Belles-Lettres de Bruxelles 9(2): 374. 1842.

Tradescantia Martensiana Kunth, Enumeratio Plantarum 4: 697. 1843.

Callisia Martensiana (Kunth) C. B. Clarke in A. & C. De Candolle, Monographiae Phanerogamarum 3: 312. 1881.

Callisia multiflora (Martens & Galeotti) Standley, Journal of the Washington Academy of Sciences 15: 457. 1925.

Leptocallisia multiflora (Martens & Galeotti) Pichon, Notulae Systematicae 12(3-4): 226. 1946.

Fig. 11. Aploleia multiflora. Reproduced from Curtis's Botanical Magazine 81: tab. 4849. 1855 ("Tradescantia Martensiana").

Slightly hairy or smooth stems to 5 dm. long are sometimes branched above. The elliptic-lanceolate leaves are minutely and densely hairy, to 4.5 cm. long, 1.8 cm. wide. Fragrant white flowers are borne in pedunculate pairs of sessile cincinni from leaf axils and from axils of bracts on smooth slender axillary branches of a much ramified inflorescence. Individual flowers are borne on slender, often dark-glandular-hairy pedicels exceeding the bractlets. The green sepals are about 2 mm. long and dotted with dark-glandular hairs; the petals are 3-4 mm. long. Stamens are 3 and opposite the sepals. No hairs are present on the trilocular ovary which continues into a very short style capped by a 3-lobed translucent penicilliform stigma.

Aploleia multiflora is much less widely distributed than A. monandra. It occurs only in southern Mexico and Guatemala. Living material has not been available for study. A fine illustration of the species as Tradescantia Martensiana appears in Curtis's Botanical Magazine 81: pl. 4849, 1885, and is reproduced here as Fig. 11.

Aploleia monandra (Swartz) H. E. Moore, tr. nov.

Callisia umbellulata Lamarck, Tableau Encyclopedique 1: 130. t. 35, f. 2. 1791.

Tradescantia monandra Swartz, Nova Genera et Species Plantarum, seu Prodromus 57. 1788; Flora Indiae Occidentalis 1: 597. 1797.

Callisia monandra (Swartz) Schultes & Schultes f., Systema Vegetabilium 7: 1179. 1830.

Aploleia diffusa Rafinesque, Flora Telluriana 2: 17. 1837 ("1836").

Callisia delicatula Kunth, Enumeratio Plantarum 4: 63. 1843.

Callisia scopulorum Brandegee, Zoe 5: 173. 1903.

Leptocallisia umbellulata (Lamarck) Pichon, Notulae Systematicae 12(3-4): 226. 1946.

Leptocallisia monandra (Swartz) Ludwig & Rohweder, Reportorium Specierum Novarum Regni Vegetabilis 56: 282. 1954.

The slender stems of this delicate species may reach a length of 5 dm. They are smooth at the base but often glandular hairy above, with ovate-lanceolate light green thin leaves to 4 cm. long, 2 cm. wide. Inconspicuous flowers are borne in sessile paired concinni on a laxly much-branched inflorescence. The flowers are borne on glandular-hairy to glabrous pedicels to 15 mm. long, much exceeding the subtending bractlets. Glands, when present, are translucent. Sepals are 2-3, green, glandular-hairy, scarcely 2 mm. long; petals are 2-3, white or nearly translucent, about equalling the sepals;

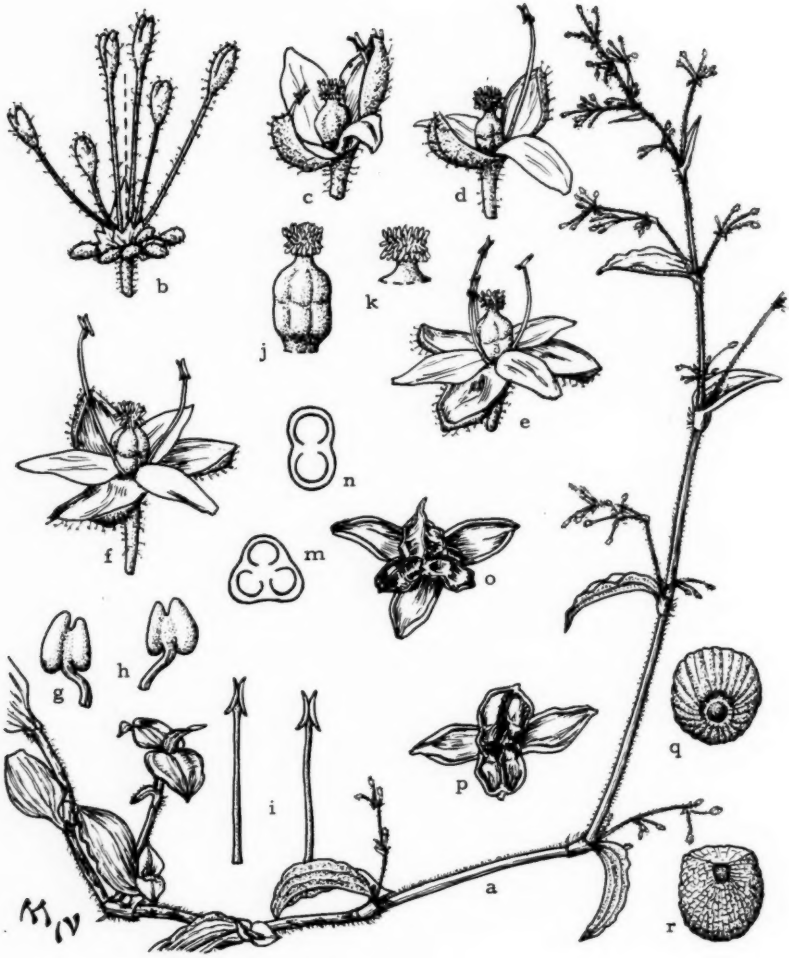


Fig. 12. Aploleia monandra: a, habit x 2/3; b, paired cincinni x 3, separation indicated by dashed line; c, d, e, f, flowers x 8; g, h, anthers in bud, adaxial and abaxial views x 16; i, stamens dehisced at anthesis x 12; j, pistil x 12; k, stigma x 16; m, n, pistils in cross section x 16; o, p, dehisced capsules x 6; q, r, seeds showing dorsal embryostega and hilum respectively x 20.

stamens are 1, 2, or 3 in flowers from the same cincinnus (when 3, then the sepals and petals also usually 3), the glabrous subulate filaments are erect, terminated by a linear anther with very slender connective, the apex and base of the anther bifid at anthesis but not in bud. The ovary contains 2-3 cells, each with 2 uniseriate ovules; the very short style is tipped with a penicilliform translucent stigma. Fruit is a 2-3-valved capsule with yellowish-brown striate seeds. Chromosome complement: n = 7.

Aploleia monandra, originally described from Jamaica, is widely distributed in tropical America, chiefly in the Caribbean region from eastern Mexico to northern South America but appearing also in the Cape region of Baja California, Mexico, where perhaps adventive. The type of Callisia scopulorum (Brandegee s.n.), kindly loaned by authorities of the University of California herbarium, is definitely referable to Aploleia monandra.

The most noteworthy feature of the plants of A. monandra cultivated at Cornell is the variable nature of the flowers. These are very small and abundant, opening in the morning and closing by noon. The sepals are green, the petals translucent white. Sepals, petals, stamens and locules of the pistil vary in number in a single cincinnus. Flowers may be three-parted with 3 sepals, 3 petals, 3 stamens, and 3 locules in the pistil; or with 2 sepals, 3 petals, 2 or 3 stamens, and 2 locules in the pistil; or, most commonly, with 2 sepals, 2 petals, 1 or 2 stamens, and a bilocular pistil.

The first flower in each cincinnus appears usually to have a two-parted flower with only a single stamen which curves inward so that the anther is in line with the stigma and the flower appears slightly zygomorphic. Succeeding flowers often have two stamens or are completely or incompletely three-parted. This phenomenon has been observed on many days over a two-year period but without the detailed study of development that seems deserved. Fruit matures very rapidly and has been produced in relative abundance in 1961. Persons wishing to grow Aploleia monandra may obtain seed by requesting it from the Editor.

Chromosome counts for A. monandra have been obtained from these plants, both from buds (n = 7) by Robert W. Read in 1960 and from root-tips (2n = 14) by Thomas R. Pilarczyk in 1961. Specimens are on deposit at the L. H. Bailey Hortorium.

Two Bergenia Hybrids

Peter F. Yeo[1]

Two interspecific hybrids belonging to the genus Bergenia Moench (Saxifragaceae) are dealt with in this paper. One is well known and has been described several times before. The present account brings forward the earliest valid name and indicates its synonymy. The second hybrid is little known, but is represented by several cultivars; as far as I know it has never received a description valid according to the International Code of Botanical Nomenclature.

I. Bergenia × Schmidtii

Bergenia × Schmidtii (Regel) Silva-Tarouca, Unsere Freiland-Stauden p. 43. 1910, pro specie.

Saxifraga Schmidtii Regel, Gartenflora 27: 225-6. tafel 946. 1878; Nicholson, Illustrated Dictionary of Gardening 3: 375. 1886.

Saxifraga Stracheyi Hooker f. & Thomson var. Schmidtii (Regel) F. T. Hubbard in Bailey, Standard Cyclopedia of Horticulture 6: 3086. 1917, pro parte, excl. fig. cit. ex Botanical register.

Bergenia Stracheyi (Hooker f. & Thomson) Engler var. Schmidtii (Regel) Hort. ex Wehrhahn, Die Gartenstauden 1: 547. 1931.

Saxifraga ligulata Wallich var. speciosa Verlot, Revue Horticole 40e annee: 270-3, and coloured plate (as S. ligulata). 1868.

Bergenia ligulata (Wallich) Engler var. speciosa (Verlot) Hort., Hand-list of Rock Garden Plants Cultivated in the Royal Botanic Gardens, Kew, ed. 4. 21. 1934.

Bergenia ornata Stein ex Guillaumin, Bulletin du Muséum national d'histoire naturelle, Paris 34: 359-60. 1928.

Saxifraga ornata Decaisne, nomen in Herb., 1876 (specimen in Herb. Paris seen).

Bergenia ornata (Saxifraga ornata Decaisne) Clos, Bulletin de la Societé botanique de France 41: 397. 1894, nomen nudum.

[1]University Botanic Garden, Cambridge, England.

The following names probably refer to B. × Schmidtii:

Saxifraga × speciosa Leichtlin, Gartenflora 35: 349. 1886, and 442. 1886, nomen nudum.

Megasea speciosa Hort., Garden 29: 342. 1886, nomen nudum.

Bergenia ornata Stein, Gartenflora 37: 307. 1888, nomen nudum.

Bergenia × subciliata A. Braun (ms., fide Engler & Irmscher, Das Pflanzenreich, IV, 117: 675) ex Engler, Die Pflanzenfamilien, III, 2A: 51. 1890 (B. crassifolia × B. ligulata), nomen nudum.

Saxifraga Leichtlinii Hort., Gardeners Chronicle 82: 422. 1927, nomen nudum.

Bergenia ligulata Engler var. Leichtlinii Hort. ex Wehrhahn, Die Gartenstauden 1: 547. 1931, nomen nudum.

The following names have been used for this plant in error:

S. Stracheyi: sensu Hooker f., Curtis's Botanical Magazine 98: t. 5967. 1872; sensu Shunji Watari, Journal of Japanese Botany 13: 914-923. 1937.

B. ligulata: sensu Boynton, Addisonia 6: 29, and t. 207. 1921.

B. crassifolia: sensu Silva-Tarouca, Unsere Freiland-Stauden p. 45. abb. 77. 1910, and later editions, as regards photographs; sensu Braun-Blanquet in Hegi, Illustrierte Flora von Mitteleuropa IV, 2: fig. 937 only. 1922.

B. bifolia: sensu Wehrhahn, Die Gartenstauden I: 546. 1931, as regards photograph.

Additional illustrations:

Jardin 18: 197. 1904; P. L. de Vilmorin, Hortus Vilmorinianus p. 168. plate 17. 1906; both as B. ornata. Revue Horticole, 1923: 437, as Megasea ornata.

Garden 71: 250. 1907; Journal of Horticulture 60: 393. 1910; Gardeners Chronicle 77: 263. 1925; all as S. ligulata [var.] speciosa. Garden 88: 415-6. 1924, described as S. ligulata var. speciosa, figured as Megasea speciosa.

Herbarium specimens seen:

Herbarium of University Botanic Garden, Cambridge: specimens cultivated in Cambridge Botanic Garden, dated 1954 to 1960; in a private Cambridge garden 12/3/1959; at Dorchester by Dr. A. Lisney 11/3/1959; and in the Royal Horticultural Society's Gardens, Wisley, 9/4/1959.

Fig. 13. Bergenia × Schmidtii. From Revue Horticole 40: col. p. preceding p. 271. 1868 ("Saxifraga Ligulata").

K[1]: specimens cultivated at Kew under the names S. Schmidtii, B. cordifolia var. compacta, B. ligulata var. speciosa, B. Stracheyi var. alba, specimens cultivated elsewhere in England, and specimen 11/78 named S. ornata communicated by Decaisne, Herb. Mus. Paris.

P[1]: S. ornata Decaisne, 1878, J. Hennecart, J. Decaisne.

Bergenia × Schmidtii differs from B. cordifolia (Haworth) Sternberg and B. crassifolia (Linnaeus) Fritsch in its ciliate leaf-margins; from B. ciliata (Haworth) Sternberg in having its leaves generally more tapering towards the base, in its taller and more profuse panicle, which branches higher up, and, usually, in having pink petals; and from B. Stracheyi (Hooker f. & Thomson) Engler in its larger, broader, longer-stalked leaves and tall inflorescence with more spreading petals.

Description:

Leaf blades broadly obovate to obovate-elliptic, narrowed to a rounded or shallowly cordate base, often drooping, those of overwintering leaves mostly 10-20 cm. long, 2/3 as broad as long to nearly as broad as long, margin ciliate-denticulate, also shallowly and broadly toothed in the distal portion. Stipular sheath with margin sometimes ciliate above, portion of petiole between sheath and lamina (1/8-)1/6-3/4 as long as lamina.

Early-flowering. Inflorescence in full flower slightly shorter than, to slightly longer than, the leaves; scape and inflorescence branches usually flushed bright red, with sparse short-stalked or sessile glands. Scape usually with one large bract inserted at about half the height of the inflorescence, frequently with one or more smaller ones higher up, usually branching from near the middle, the main branches arching or recurved, forming, when well developed, an ample panicle, more or less spherical at first, later hemispherical and rather loose. Flowers at first nodding, soon horizontal to erect, broadly companulate, about 2 - 2.5 cm. in diameter; calyx coloured as the inflorescence branches, lobes oblong, rounded at the apex, erect; petals spreading above, bright rose-pink (basic tints, determined with the Horticultural Colour Chart, 27 - 32, usually 30, intensity — /3, or 6—/2 - 3, or 5— /2 - 3), darker at the claw, oblong or broadly ovate, 13-17 mm. long (including claw 1 - 2.5 mm. long, 8 - 13 mm. wide, becoming more obovate in age, claw lengthening to 2 - 4 mm.; filaments white, becoming reddish-purple, anthers pinkish or purplish, pollen cream or yellow; carpels and styles reddish-tinged in age.

Of the binomials cited here for this hybrid, only B. ornata and B. × subciliata have appeared in the Index Kewensis. References

[1]Herbarium abbreviations used are those suggested by Index Herbariorum, ed. 4, 1959.

given there for B. ornata are to Stein and Clos (in Supplement 1) and to Guillaumin (in Supplement VII). Although Clos referred to Decaisne's S. ornata, he gave no description, and Decaisne's name has not been validly published. The account by Verlot of S. ligulata var. speciosa is somewhat ambiguous. He writes - translated - "We note that cultivation has strongly modified the ordinary Saxifraga ligulata ... without resort to seeds (this at least is very probable); the cultivation to which this plant has been subjected has sufficed to make it assume characters which it did not appear to possess in the natural state." I have assumed that his figure of "S. ligulata" is this modified state, and that the modified state is also what he described as S. ligulata var. speciosa, though this is not explicit. In my view there must have been reproduction by seed for this plant to have arisen. Confusion was caused in 1872 when Hooker described and figured this hybrid in Curtis's Botanical Magazine under the name S. Stracheyi; since Hooker was himself part-author of the name S. Stracheyi, his illustration of 1872 was readily accepted as representing that species. It is noteworthy, however, that C. B. Clarke correctly omitted to cite Hooker's plate in his account of S. Stracheyi in Flora of British India 2: 398, 1878, and that L. H. Bailey queried it in Cyclopedia of American Horticulture 4: 1619, 1902.

After 1872 the hybrid was described repeatedly as new, first by Regel who supposed that B. × Schmidtii came from the Himalaya, Verlot's name having more or less disappeared from the literature for the time being. Regel's plate is strikingly similar to Hooker's. Later the names B. ornata and B. × subciliata were brought forward by authors who either did not see that their plants were the same as those already described as S. ligulata var. speciosa and S. Schmidtii, or were ignorant of these two names. Like S. Schmidtii, B. ornata was supposed, by Guillaumin, to come from the Himalaya.

The names S. Leichtlinii, M. speciosa, S. × speciosa, and S. ligulata var. Leichtlinii are treated as nomina nuda here because the few words of description are clearly not intended to identify the plants. If such names are treated as validly published they are normally nomina dubia, and cannot then be legitimately applied to the plants for which they are actually being used. If, however, they are treated as not validly published, validation can be carried out if required, and certain name changes thereby avoided. There is a connection between the names S. speciosa and S. Leichtlinii on the one hand, and S. ligulata var. speciosa on the other, through the appearance in Barr's catalogues for 1899-1902 of "Saxifraga ligulata speciosa Leichtlinii."

The valid publication of the combination Bergenia × Schmidtii is here ascribed to Silva-Tarouca because he cited, without authority, the synonym Saxifraga thysanodes. Regel states in his account of S. Schmidtii that he received this plant incorrectly named S. thysa-

nodes. (S. thysanodes Lindley = B. ciliata (Haworth) Sternberg.) Silva-Tarouca's synonym can therefore be regarded as an indirect reference to the name published by Regel.

This plant is evidently a hybrid between a species with eciliate leaves and tall panicles branching only near the top (either B. cordifolia (Haworth) Sternberg - leaves orbicular, cordate, or B. crassifolia (Linnaeus) Fritsch - leaves obovate) and a species with ciliate leaves and shorter panicles branching near the base (either B. Stracheyi - leaves obovate, or B. ciliata (Haworth) Sternberg - leaves more or less orbicular). All four of these species were in cultivation well before the hybrid was first figured and described, so that any of the four crosses here considered possible might have taken place. On morphological grounds it seems that B. crassifolia × B. ciliata is the most likely parentage, and B. cordifolia × B. Stracheyi the next most likely. This assumes that B. × Schmidtii is an F_1 hybrid; if it was an F_2 or back-cross, one would have to be more tentative in suggestions as to parentage. However, the plant usually shows little variation, and it therefore seems to be a vegetatively propagated F_1 clone, or possibly several clones having arisen from the same parent species on different occasions. The form of B. ciliata involved is presumably the one with no hairs on the leaf surface, a plant usually known as B. ligulata (Wallich) Engler. The parentage which I suggest for B. × Schmidtii is thus the same as that given by Engler for the nomen nudum B. × subciliata.

In its earliness of flowering, February or March in England, and sometimes also in autumn, B. × Schmidtii differs from any of its possible parents.

The vigour and beauty of this plant doubtless explain why it is so common in gardens, and its vigour may also be the reason why it has so frequently appeared over the names of other species in photographs, or been described under other names. It is certainly by far the commonest Bergenia in English gardens, and it is apparently common on the continent of Europe too, judging by its frequency in photographs published there; it is also grown in the United States and Japan.

Although B. × Schmidtii is usually rather uniform, it is probably fertile, as there is at the Cambridge Botanic Garden a plant, probably raised from seed from another botanic garden, which appears to be B. × Schmidtii × B. cordifolia. Also, a number of named cultivars with ciliate leaves exist which appear to be derived from B. × Schmidtii.

On a number of occasions the hybrid origin of B. × Schmidtii (under one or other of its names) has been recognized, as by Irving (Garden 88: 415-6. 1924) for S. ligulata speciosa: "a form or hybrid

of S. ligulata"; by Leray (Revue Horticole, 1923: 436-8) for Megasea ornata: "generally recognized as a hybrid of M. ligulata"; by A. Braun (according to Engler, Pflanzenfamilien) for B. × subciliata; and lastly by C. Schneider (New Flora and Sylva 4: 137. 1932), who drew attention to the similarity of B. × subciliata, S. ligulata var. speciosa, and B. ornata. Also, the hybrid origin of B. × Schmidtii was recognized by Leichtlin, if in fact Saxifraga speciosa is the same, for he said (Garden 29: 442. 1886) that it arose through insect-pollination between B. Stracheyi and B. cordifolia 'Purpurea'.

Technically all individuals which contain B. crassifolia and B. ciliata in their ancestry (if these are in fact the parents) should normally be included under the same binomial, i.e., B. × Schmidtii; however, the description given here has been drawn up from the common garden forms which appear to be half-way intermediates between the parents.

If it should prove impossible to distinguish with certainty between B. ciliata × B. crassifolia and, for example, B. cordifolia × B. Stracheyi, it may in the future be considered expedient to include this and similar hybrids in B. × Schmidtii. There is in the University Botanic Garden, Cambridge, a plant which I am at present regarding as a variant of B. × Schmidtii, in which the larger, longer-stalked, and more cordate leaves and paler flowers suggest the parentage B. cordifolia × B. ciliata.

II. Bergenia × newryensis

Bergenia × newryensis P. F. Yeo, hybr. nov.

Saxifraga cordifolia × S. purpurascens, Gardeners Chronicle 19: 538, 597. fig. 97. 1883.

Megasea hybrida splendens T. Smith, Garden 29: 460. 1886.

M. cordifolia × M. purpurascens and cultivars, Burbidge, Garden 37: 299-300. 1889.

B. × Smithii Engler (B. purpurascens × cordifolia), Die Pflanzenfamilien 18a: 118. 1930, nomen nudum; Silva-Tarouca and C. Schneider, Unsere Freiland-Stauden, ed. 3. 136. 1922, nomen nudum.

A B. cordifolia (Haworth) Sternberg inflorescentia folios distincte excedente, floribus paucioribus, majoribus, saepe intensius coloratis, petalis magis obovatis, minus patulis, staminibus stylisque longioribus; a B. purpurascente (Hooker f. & Thomson) Engler foliis suborbicularibus, saepe cordatis; a B. crassifolia (Linnaeus) Fritsch foliis suborbicularibus, saepe cordatis, floribus saepe intensius coloratis differt.

Differs from B. cordifolia (Haworth) Sternberg in having the inflorescence distinctly exceeding the leaves, and in having fewer, larger, often deeper-coloured flowers, more obovate, less spreading petals, and longer stamens and styles; from B. purpurascens (Hooker f. & Thomson) Engler in its suborbicular, often cordate leaves, and often deeper-coloured flowers.

Leaves glabrous; lamina orbicular or ovate-suborbicular, rounded or cordate at base, those of overwintering leaves mostly 7-18 cm. long, (.75-) .8-.9 (-1) times as broad as long, margin reddish, sometimes thickened and recurved, shallowly to rather deeply crenate-serrate; petiole from apex of stipular sheath to base of lamina usually .25-.5 times as long as lamina. Flowering rather late. Inflorescence when in full flower distinctly taller than the leaves; scape and inflorescence branches moderately strongly flushed red to almost entirely deep red, with numerous dark red glandular hairs or sparse sessile glands. Scape usually with one bract, branches confined to the top, or one arising at 1/2 - 3/4 the height of the inflorescence, the upper branches rather short, ascending, shortly recurved at apex, inflorescence therefore rather small and compact, more or less secund, flowers moderately loose to dense, usually more numerous than in B. purpurascens but fewer than in B. cordifolia. Flowers more or less nodding, sometimes becoming more or less erect later, companulate, sometimes rather broadly so; calyx coloured as the inflorescence branches, 7-11 mm. long in well-developed flowers (including the hypanthium), lobes obtuse, oblong to oblong-ovate, erect; petals pink, rose-lilac, or varying shades of reddish purple, becoming redder with age, and also paler, especially outside, obovate or broadly obovate, 7.5-10 mm. wide, 13-18 mm. long, including claw of 2-4 mm. length, which is not, however, always very distinct from the lamina; filaments white or purplish, long (9-10 mm.), slender; carpels and styles green, styles long and slender, about equalling stamens but longer in age, sometimes becoming reddish.

Holotype:

Bergenia cordifolia × B. purpurascens, 10/4/1959, Herb. Hort. Bot. Univ. Cantab. no. 389-58 Edinburgh, received as B. ligulata var. speciosa (CGE[1]).

Herbarium specimens seen:

Herbarium of University Botanic Garden, Cambridge: Specimen as above but dated 19/4/1960; B. cordifolia × B. purpurascens 291-59 Sunningdale no. 5.

E[1]: C1831 as B. crassifolia, C1832 as B. ligulata var. speciosa, both May, 1957.

K[1]: specimen cult. Hillier's of Winchester, No. 4, 7/5/1959.

[1]Herbarium abbreviations used are those suggested by Index Herbariorum, ed. 4, 1959.

The name Bergenia × Smithii Engler was published without a description or a reference to a description; it must therefore be rejected, as a nomen nudum. It probably refers to the plant with abnormal flowers described in the Gardeners Chronicle in 1883, a cross between B. cordifolia and B. purpurascens raised by T. Smith of Newry, North Ireland. In 1886 Smith described his Megasea hybrida splendens, a hybrid of the same parentage, but evidently not having abnormal flowers. At the same time, Smith stated that the cross had produced many forms, and in 1889 (Garden 35: 449) he said he had some fifty selected forms under trial. Burbidge's note of the same year stated that Smith had carried out reciprocal crosses, and described a number of cultivars; others of this parentage have been described since then, and I hope to be able to give an account of some of the cultivars of B. × newryensis eventually.

The name hybrida has been used since 1886 in books and catalogues, in some instances for B. cordifolia × B. purpurascens, in others for hybrids of mixed parentage distributed by the firm of Georg Arends in Germany since 1895 (information kindly supplied by Mr. Georg Arends). Bergenia hybrida is probably used in the sense of the latter in the various editions of Silva-Tarouca's Unsere Freiland Stauden and possibly also in Späth-Buch 1720-1929 (p. 276) and Späth-Buch 1720-1930 (p. 450).

I am indebted to Dr. H. R. Fletcher, Mr. J. S. L. Gilmour, the late Mr. N. K. Gould, Mr. J. Keenan, Dr. A. Lisney, Mr. J. R. Sealy, Mr. P. D. Sell, Mr. G. S. Thomas, Miss P. Williams, the Keeper of the Kew Herbarium, and the Director, Muséum Nationale d'Histoire Naturelle, Paris, for the gift, loan, or use of specimens, gifts of plants, advice, and information.

VALIDATION OF THE NAME Griffinia Rochae

Through an oversight, the nomenclatural type of Griffinia Rochae G. M. Morel was not indicated when the name was published in Baileya 8: 133-135, (Jan. 16) 1961 ["December 1960"]. As this is necessary for valid publication, the nomenclatural type is indicated here. Since the International Code of Botanical Nomenclature (1956), Art. 45, stipulates that "when the various conditions for valid publication are not simultaneously fulfilled, the date is that on which the last is fulfilled, "the actual date of publication of Griffinia Rochae is March 31, 1961, the mailing date of this present issue.

Type of Griffinia Rochae G. M. Morel:

Cult. in greenhouse, Centre National de Recherches Agronomiques, Versailles. Bulb originally collected by Severo Rocha at Xerem, prov. Rio, Brazil. Coll. Georges Morel, Feb. 15, 1960. [Type in L. H. Bailey Hortorium herbarium.]

Chlorophytum (Liliaceae) in Cultivation

William J. Dress

Conservative estimates place the number of species of Chlorophytum at over 100; however, Karl von Poellnitz, in "Die Chlorophytum-arten Tanganyikas" in Portugaliae Acta Biologica 1: 255-383, 1946, has listed and described 113 species for the territory of Tanganyika alone (including 23 species of section Dasystachys, which some botanists maintain as a separate genus), and E. P. Phillips (The Genera of South African Flowering Plants, ed. 2, p. 184, 1951) places the number at about 215. The species are chiefly tropical- and subtropical-African, with some in India, southeast Asia, and tropical Australia, and a few outliers in Peru, Brazil, and Tasmania. Since these regions comprise areas still incompletely known botanically, it may be expected that new species will continue to be discovered and described from time to time.

Comparatively few species have ever been cultivated outside of botanic gardens, and only a very, very few have ever come into general cultivation. Chlorophytum comosum, however, is one of the most common of window-plants, and has even a vernacular name - spiderplant - to indicate its long popularity. With the growing interest in and importance of tropical foliage plants, a few other species have made their appearance in the collections of amateurs and of nurserymen who specialize in the uncommon. Like C. amaniense, these may achieve a fairly wide distribution in cultivation and yet remain unidentified and nameless for a long while. Since seeds of a number of species are offered in the exchange lists of European botanic gardens, it is to be expected that some of these will sooner or later find their way into cultivation in America, among enterprising and curious dealers in exotic tender plants. For this reason, the key to the cultivated species which follows includes all those now known by the author to be or to have recently been available as seeds or plants, in Europe as well as in America, from botanical gardens as well as commercial sources. It is unlikely that many will attain real popularity or permanence in general cultivation, since there is nothing remarkable about the foliage of most, and their flowers are ornamentally either without merit entirely or of only modest appeal.

The genus Chlorophytum was set up in 1808 by Ker-Gawler at the time he described the species C. inornatum, which is therefore the type-species of the genus (Curtis's Botanical Magazine 25: 1071. 1808). Many of the other species now comprised by the genus were described first as species of Anthericum, or have borne the generic names Asphodelus or Phalangium, having been transferred to Chlorophytum later when the distinctions between it and Anthericum and Asphodelus became more clearly defined, or when characteristics of the species were more completely and satisfactorily known. Phalangium is not now recognized as a valid genus; species of many different liliaceous genera have in the past been assigned it.

Chlorophytum is a genus of short-rhizomatous herbs with either fibrous or fleshy-thickened roots and radical leaves which are either sessile and linear or petioled with lanceolate to ovate blades. The inflorescence is scapose, with usually one or more leaflike bracts in the lower part, the upper part a raceme, or a panicle made up of racemose branches, bearing small white or greenish flowers on short jointed pedicels grouped in two's and three's at the lower axils but usually solitary at the uppermost ones, and subtended by small bracts. The flowers are rotate, the six essentially equal segments separate to the base and not twisting upon withering; the six stamens carry basifixed, inwardly dehiscent anthers; the pistil consists of a capitate stigma, filiform style, and an ovoid, three-celled ovary with several ovules in each cell. The fruit is a deeply 3-lobed or sharply angled or winged capsule which dehisces loculicidally; the seeds are black, discoid and somewhat compressed but not flat.

From Anthericum, the genus to which it is most closely related, Chlorophytum is distinguished by its deeply 3-lobed or sharply angled rather than bluntly angled, not distinctly lobed capsule, and by its flattened, discoid rather than 3-angled seeds. In addition, the leaves in Anthericum are always linear, whereas in Chlorophytum they are in many species petiolate with rather broad blades.

Chlorophytum, as well as Anthericum, is badly in need of revisionary study. Published descriptions, particularly the older ones, are not always adequate for satisfactory characterization of the species, and many were based on only a single or a very few specimens. Again, descriptions of a particular species published by different writers or by the same author at different times, do not always agree in details. The following key is based almost entirely upon published descriptions of the species concerned, since little actual material has been available for first-hand observation. It is therefore of a tentative nature. Some species have been included at different places in the key, not necessarily because they are variable, but sometimes because it has not been possible to determine definitely the status of those species with respect to particular characteristics. It may be helpful to explain here that a laxly

flowered inflorescence is one in which the internodes between the flowering nodes are rather long, so that the flowers are well separated along the axis, and that the peduncle (scape) is the basal portion of the inflorescence-axis, from its origin in the rhizome to the lowest flower-bearing node.

Key to the Cultivated Species of Chlorophytum

1. Inflorescence laxly flowered.
   2. Leaves linear-lanceolate to ovate-lanceolate, distinctly petioled.
      3. Inflorescence considerably shorter than (1/2 to 3/4) the leaves; perianth-segments 7-8 mm. long, white.
         4. Leaves green, 20-33 mm. wide; pedicels jointed above the middle. . . . . C. Hoffmannii
         4. Leaves margined with yellow or white, 8-16 mm. wide; pedicels jointed below the middle. . . . . C. Bichetii
      3. Inflorescence about as long as, to much longer than, the leaves.
         5. Inflorescence a simple raceme or sometimes with a single branch at the base of the flower-bearing portion.
            6. Internodes between the lowermost flower-bearing nodes of the racemes 3-7 cm. long; perianth-segments 4-5 mm. long. . . . . C. usambarense
            6. Internodes between the lowermost flower-bearing nodes of the racemes less than 3 cm. long, usually much less.
               7. Peduncle 2.5-5.5 cm. long; longest leaf-blades 8-15 cm. long, rather obtuse, somewhat rounded toward the base and rather abruptly narrowed to the petiole. . . . . C. alismaefolium
               7. Peduncle 12-60 cm. long; longest leaf-blades 15-30 cm. long, acute to acuminate, tapered either gradually or rather abruptly to the petiole.
                  8. Leaf-blades 5-6 cm. broad, with reddish petioles; axis of the inflorescence glabrous; pedicels jointed above the middle. . . . . C. Huygei
                  8. Leaf-blades 1.5-4 cm. broad, with green petioles; axis of the inflorescence glabrous or minutely scabrid-pubescent. (Compare, also, C. brevipes and C. Mannii in the text.)
                     9. Lower internodes of racemes 6-12 mm. long; axis of inflorescence minutely scabrid-pubescent; fruits as long as or longer than broad, 8 mm. or more long. . . . . C. inornatum
                     9. Lower internodes of racemes 18-30 mm. long; fruits broader than long, ca. 5-6 mm. in diameter.
                        10. Leaf-blades 1.5-2.5 broad; inflorescence-axis glabrous; pedicels jointed above the middle. . . . . C. togoense

10. Leaf-blades 3-4 cm. broad; inflorescence-axis minutely scabrid-pubescent; pedicels jointed at the middle. . . . . C. sparsiflorum

5. Inflorescence paniculate, usually with 3 or more lateral branches.

11. Leaves 1.2-3.5 cm. wide; flowers white.

12. Lower internodes of raceme 3-7 cm. long; bracts subtending the flowers at the lower nodes 6-22 mm. long. . . . . C. usambarense

12. Lower internodes of raceme 2-3 cm. long; bracts subtending the flowers at the lower nodes 5-8 mm. long. . . . . C. togoense

11. Leaves 4-10 cm. wide; flowers greenish.

13. Bracts at lowermost flower-bearing nodes of inflorescence broadly lanceolate; leaf-blades about 5-6 cm. broad. . . . . C. orchidastrum

13. Bracts at lowermost flower-bearing nodes of inflorescence linear-lanceolate; leaf-blades up to 9-10 cm. broad. . . . . C. Seretii

2. Leaves lanceolate to linear or lorate, narrowing somewhat toward the base but hardly petiolate.

14. Inflorescence simple or with 1-3 branches; flowers small, greenish or greenish-white, the segments 3-4 mm. long.

15. The leaves oblong-lanceolate, to 15 cm. long and 18-31 mm. broad; inflorescence with 1-3 branches. . . . . C. ukambense

15. The leaves linear, 10-50 cm. long and 5-12 mm. broad; inflorescence simple or with one branch. . C. laxum forma javanicum

14. Inflorescence simple or with up to 6 or more branches; flowers white, larger, the segments about 8 mm. or more long.

16. Leaves green above, glaucous on lower surface; inflorescence not producing young plants at the flowering nodes. . . . . C. nepalense

16. Leaves green above and below or variegated; inflorescence with or without young plants at some of the flowering nodes.

17. The leaves linear, 20-40 cm. long, 12-18 mm. wide, with 12-16 distinct parallel veins in addition to the midrib; seeds 3-5 per locule; inflorescence producing young plants at some of the flowering nodes. . . C. comosum

17. The leaves lorate, 30-60 cm. long, 24-36 mm. wide, with 20-30 distinct parallel veins in addition to the midrib; seeds 5-6 per locule; inflorescence not producing young plants at the flowering nodes. . . C. capense

1. Inflorescence densely flowered.

18. Leaves lanceolate or oblanceolate, definitely narrowed to a petiole or petiole-like base.

19. Peduncle 5 cm. or less long.

20. Widest leaves [3-] 5-8 cm. wide; leaf-bases and petioles a peculiar orange-tan in color; peduncles 2-5 cm. long; seeds about 4 in each locule of the fruit. . . . . C. amaniense

20. Widest leaves 2.5-4.5 cm. wide, leaf-bases and petioles green; peduncles 1.3-2.5 cm. long; seeds 8-10 in each locule of the fruit. . . . . C. Heynei

19. Peduncle mostly 15-50 cm. long.

21. Leaves 3.5-5 cm. wide, 15-45 cm. long; pedicels jointed at the middle; anthers longer than the filaments. . . . . C. arundinaceum

21. Leaves 5-7.5 cm. wide, 50-75 cm. long; pedicels jointed near the apex; anthers and filaments about equal in length. . C. macrophyllum

18. Leaves linear or lanceolate, somewhat narrowed basally but scarcely with a petiole-like base.

22. The leaves linear, 2.5 cm. or less wide, with 14-26 distinct parallel veins in addition to the midrib.

23. Width of leaves 4-12 mm.; ovules 5-8 per locule. . . . . C. gramineum var. madagascariense

23. Width of leaves 13-25 mm.; ovules 3-4 per locule. . . . . C. indicum

22. The leaves lanceolate, 5-7.5 cm. wide, mostly with 30-40 distinct parallel veins in addition to the midrib. . . . . C. macrophyllum

Chlorophytum alismaefolium Baker, Journal of the Linnaean Society 15: 324. 1876.

The plant has 4-6 leaves, the thin, lanceolate, 10-12-ribbed blades 10-15 cm. long and 15-20 mm. wide at the broadened and somewhat rounded base, which narrows rather abruptly into the slender channelled petioles 7-10 cm. long. The scape is rather short, bearing a slender simple or once-branched lax raceme, 8-15 cm. long, of white flowers. This species grows on the banks and rocks along rivers in west Africa, in Sierra Leone, Liberia, southern Nigeria, and Gabon, and is said by Engler to be often inundated by the river waters. Perhaps it could be pressed into service as a decorative aquarium plant. The epithet is sometimes spelled alismifolium, which is allowable under Article 73, Note 2, of the 1956 Botanical Code, but this was not the original spelling used by Baker.

Chlorophytum amaniense Engler, Botanische Jahrbucher... 34: 157. 1904.

This is one of the most attractive species. The 6-10 broadly lanceolate glossy leaf-blades are 12-30 cm. long by 3-8 cm. broad, with about 20-26 nerves, and taper at the base to channelled petioles 5-15 cm. long and 4-8 mm. broad. The petioles as well as the base and lower margins of the blades are a peculiar pinkish-orange-buff in color, especially when the plant is grown in good light. The inflorescence is stout and much shorter than the leaves, with a scape less than 5 cm. high and a dense raceme, 6-12 cm. long, of greenish flowers overtopped by their narrow subtending bracts. The oblong capsules are 10-14 mm. long, 7-9 mm. broad.

Fig. 14. A, B, Chlorophytum alismaefolium. C, D, C. macrophyllum. E, F, G, C. amaniense. H, C. Schimperi [not cult.]. From Engler, Die Vegetation der Erde 9 (2): Fig. 208. 1908.

This is native to the rain forests of east Africa, having originally been described from specimens collected in 1902 in ravines near the village of Amani in the Usambara Mts. of Tanganyika. It must have been introduced to cultivation at about the same time, for Engler notes, in his 1904 description of the plant, that it was flourishing in German botanical gardens and was likely to become a favorite greenhouse plant. It is in many European collections and has been in cultivation in this country for some time, but its identity is apparently seldom recognized; it is sometimes grown under the impression that it is some sort of commelinaceous representative (perhaps because of a superficial resemblance to Rhoeo spathacea [R. discolor]). It is not illustrated in Exotica 2.

Chlorophytum arundinaceum Baker, Journal of the Linnaean Society 15: 323. 1876.

This is an Asiatic species, from the subtropical region of the eastern Himalayas. Its 6-8 oblanceolate, 20-30-ribbed leaves vary from 15-45 cm. long and 2.5-5 cm. wide at their greatest breadth, narrowed below to a broad channelled petiole 5-10 cm. long. The long scape, 15-30 or more cm. long, terminates in a simple (occasionally one-branched) raceme 8-20 cm. long, the white flowers densely placed, at least in the upper portion of the raceme. The globose capsule is about 8 mm. broad. This is occasionally grown in Europe and has been offered here recently by a California nurseryman.

Chlorophytum Bichetii (S. Karrer) Backer, Handboek voor de flora van Java 3: 52. 1924.

Phalangium Bichei S. Karrer, in Möllers Deutsche Gartner-Zeitung 27: 433. 1912; R. de Noter, Revue Horticole 85: 562. 1913.

Anthericum Bicheti Hua, in Journal de la Société Nationale d'Horticulture de France (Série 4) 3: 692. 1902, nomen nudum; Encke, in Pareys Blumengärtnerei ed. 2, 1: 238. 1957.

Chlorophytum Bischii Heimbold, Gartenwelt 49: 368. 1949.

Phalangium Bischii Heimbold, loc. cit., in syn.

Apparently there is still some doubt as to whether this species is actually an Anthericum or a Chlorophytum, since Encke, as recently as 1957, in the second edition of Pareys Blumengärtnerei, called it Anthericum Bichetii. However, the most complete description that has been published is that by Backer, and he has described the fruit as (translated) "sharply 3-angled, unlobed," so it seems that Chlorophytum is where the species ought to be lodged.

This is a rather dwarf plant, to about 2 dm. high, with tuberous-swollen roots and tufts of linear-lanceolate leaves 10-20 cm. long and 8-16 mm. wide. The leaves apparently are always striped with yellowish-white, particularly along the margins, for no non-variegated form appears ever to have been noted. The inflorescences are slender, lax, usually simple, and noticeably shorter than the leaves. The flowers are relatively large for the genus, pure white, with segments 7-10 mm. long, on pedicels jointed below the middle. Some horticultural writers have described this species as deciduous during its dormant period.

The first mention of this species in print occurred in a report of the October 23, 1902, meeting of the Société Nationale d'Horticulture de France, where a plant of it was exhibited. Together with a few merely generalized descriptive remarks, there was given a brief

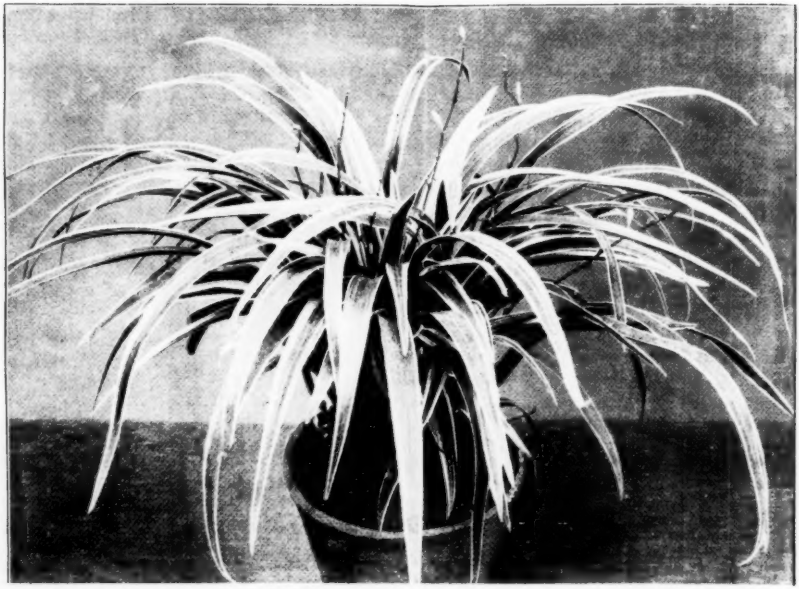


Fig. 15. Chlorophytum Bichetii. From Möllers Deutsche Gärtner-Zeitung 27: 433. 1912 ("Phalangium Bichei").

note on the plant's discovery and introduction to horticulture: (in translation) "Anthericum Bicheti Hua. This liliaceous plant comes from Gabon; it was discovered by the Reverend Father Bichet in the Fernand Vaz. It was brought back to us in 1900. Having flowered last year, Messieur Hua was able to study it and to recognize that it was a new species which he has dedicated to the Reverend Father Bichet." A few years later the German firm of Haage & Schmidt was listing in its catalogues a Phalangium Bichei, and in 1912 S. Karrer, "Obergärtner" for Haage & Schmidt, published his short article on P. Bichei, including a brief description and a photograph of a plant in bloom, a combination sufficient to legitimatize the name. There can not be much reason to doubt that Haage & Schmidt's Phalangium Bichei was the Anthericum Bicheti of Hua, though there is no actual proof of this. It is easy enough to understand how the epithet Bicheti, when pronounced "bi-shay-i" according to the pronunciation of the French name Bichet, could evolve into Bichei at the hands of German horticulturists. In fact, the epithet was later even more strongly Germanized by Heimbold, who spelled it "Bischii" in writing of the plant in 1949. Since the alteration in spelling of the epithet is easily explained as an unintentional error, I have felt

justified in correcting it to Bichetii, even though its first valid publication was as Bichei. Bichetii is also the spelling generally accepted in the horticultural literature today.

Chlorophytum brevipes Baker in Thiselton-Dyer, Flora of Tropical Africa 7: 497. 1898.

Listed only by the Botanical Garden of the University of Copenhagen, this species is unlikely to be met with outside of botanical gardens. Baker's description is not quite adequate to distinguish it unequivocally from some other species in the key presented here. It has wiry, rather than thickened roots, numerous leaves about 3 dm. long about equally divided between petiole and lanceolate blade (acute, 2.5 cm. broad at the middle, gradually narrowed to the base), a slender, lax inflorescence reaching 5 dm. with flowers 6 mm. long (color unspecified in the original description) on pedicels jointed at the middle, and fruits 4 mm. long by 6 mm. broad. It is native in Mozambique (Portuguese East Africa).

Chlorophytum capense (Linnaeus) Voss in Siebert and Voss, Vilmorin's Blumengärtnerei, ed. 3, 1: 1086. 1895.

Asphodelus capensis Linnaeus, Systema Naturae, ed. 10, p. 982. 1759.

Anthericum elatum Aiton, Hortus Kewensis 1: 448. 1789.

Chlorophytum elatum (Aiton) R. Brown ex Sprengel, C. Linnaei ... Systema Vegetabilium 2: 88. 1825.

According to the literature, plants of this species have lanceolate or strap-shaped leaves 25-60 cm. long by 2-4 cm. broad, 20-30-ribbed, somewhat narrowed toward the base but with no semblance of a petiole. The inflorescence may be up to 12 dm. long, with the scape about 3 dm. long, the flower-bearing upper part lax and copiously branched. The pedicels of the flowers are jointed at the middle or below the middle. The flowers are white, large enough to be of some ornamental value (the segments are 8 mm. long), but scattered in small clusters along the axes.

Chlorophytum capense appears to have been longest in cultivation of all the species. It was illustrated, though somewhat inaccurately, in 1755 by Miller in the work mentioned below, under the polynomial Asphodelus foliis planis, caule ramoso, floribus sparsis. Miller had received seeds of it in 1750 from the Cape of Good Hope, had germinated them in 1751, and brought the plants to flower in 1752. It was on the basis of this illustration that Linnaeus published the name Asphodelus capensis in 1759. Later the same plate was referred to, and Miller's polynomial listed as a synonym,

Fig. 16. Chlorophytum capense. Redrawn from Redouté, Les Liliacées 4: t. 191. 1807 ("Phalangium elatum").

Fig. 17. Chlorophytum capense. From Phillip Miller, Figures of the most beautiful, useful, and uncommon Plants... 1: pl. 56. 1755 ("Asphodelus foliis planis, caule ramoso, floribus sparsis").

when Aiton published Anthericum elatum in 1789. Obviously, then, Linnaeus's and Aiton's names applied to the same species. Following a suggestion of Robert Brown's (Prodromus Florae Novae Hollandiae p. 277, 1810), Sprengel in 1825 transferred Aiton's epithet to Chlorophytum. The name C. elatum thereafter became established in the botanical and horticultural literature as the name for this South African plant. In 1895 Voss resurrected the oldest epithet applied to this species, capense, from the Linnaean Asphodelus capensis,

Fig. 18. Chlorophytum capense. Redrawn from Saunders, Refugium Botanicum 3: tab. 216. 1870 ("Chlorophytum elatum").

and made the combination Chlorophytum capense. Kuntze, apparently independently, also made this necessary transfer a few years later (Revisio Generum Plantarum 3(2): 316. 1898). Much more recently S. J. van Ooststroom (Blumea 4: 493-495. 1941) reviewed the nomenclatural history of the species and pointed out again the correctness of the name Chlorophytum capense (although he assigned the authorship of this combination to Kuntze, overlooking the earlier publication of it by Voss [1895] in Vilmorin's Blumengärtnerei). Nevertheless, the name Chlorophytum elatum incorrectly continues to be used to this day in much of the horticultural literature and in the catalogues and seed lists of both commercial sources and botanical gardens.

Material generally accepted and cultivated as this species, at least in this country, tends to be proliferous after the manner of C. comosum, producing young plants with aerial roots at some of the nodes of the inflorescence. The illustration on which both Linnaeus's and Aiton's names were based (plate 56 in Phillip Miller's Figures of the most beautiful, useful, and uncommon Plants... vol. 1. 1755), reproduced here as Fig. 17, shows no hint of plantlets in the inflorescence, nor do such later illustrations as those of Redouté (Les Liliacées 4: plate 191. 1807) or Saunder's Refugium Botanicum (vol. 3: tab. 216. 1870); the text accompanying these plates makes no mention of such a viviparous condition, either. Although Baker, in his treatment of Chlorophytum in the Journal of the Linnaean Society 15: 321-333, 1876, mentions the frequent occurrence of such rosettes of leaves at the nodes and apex of the racemes as characteristic of C. comosum, he does not mention them in his description of C. elatum (= C. capense), except to quote, as though they implied something unusual, the words "saepe proliferum" [often proliferous] found on one of the herbarium sheets he had examined. In fact, when he later accounted for the genus in Thiselton-Dyer's Flora Capensis 6: 397-400, 1897, Baker separated the two species in his key (p. 397) thus: "Racemes ... not crested" (C. elatum), "Racemes crowned with a rosette of reduced leaves" (C. comosum). Some more recent authors have distinguished the two species thus also, either explicitly - e.g., Bailey and Bailey, Hortus Second, p. 173, 1941 - or implicitly, by mentioning the proliferous nature of C. comosum but not of C. capense - e.g., Chittenden, R.H.S. Dictionary of Gardening 1: 465, 1951. Such authors have merely followed Baker in making this distinction, perhaps. At any rate, the proliferous material commonly grown under the name C. capense or its synonyms is practically indistinguishable from C. comosum, so far as I have been able to observe. Perhaps some future monograph of the South African species will settle this question.

There is a cultivar with yellowish-white striped leaves known as 'Variegatum'.

Chlorophytum comosum (Thunberg) Jacques, Journal de la Société Impériale et Centrale d'Horticulture 8: 345. 1862.

Anthericum comosum Thunberg, Prodromus Plantarum Capensium 1: 63. 1794.

Phalangium comosum (Thunberg) Poiret, Encyclopédie Méthodique, Bot. 5: 252. 1804.

Anthericum Sternbergianum Schultes and Schultes f., C. Linné ...Systema Vegetabilium 7: 1693. 1830.

Chlorophytum Sternbergianum (Schultes and Schultes f.) Steudel, Nomenclator Botanicus, ed. 2, 1: 354. 1840.

This South African is the most familiar cultivated species. The leaves are linear to linear-lanceolate, 20-40 cm. long by 6-18 [-25?] mm. broad, with 12-15 ribs or nerves. Here, too, the leaves are narrowed but not petiolate basally. The simple or branched inflorescence is a total of 30-60 cm. long, the racemes of scattered clusters of white flowers (with segments about 8 mm. long) 15-30 cm. long. The pedicels or flower-stalks are jointed above the middle. Almost invariably, rosettes of leaves, complete with roots, develop at several nodes of the inflorescence, and may usually be found contemporaneous with flowers and fruits on the same racemes. The several to many inflorescences, pendant under the weight of the young plantlets they bear, give a rather cascading effect to the plant and make it suitable and popular as a hanging basket subject. It is commonly called spider-plant, in vague allusion to this appearance. The young plantlets, already complete with roots, afford a ready means of propagation and have made this one of the plants most commonly passed from one window-sill gardener to another.

Chlorophytum comosum is most commonly represented in cultivation by the variegated-leaved forms, such as cv. 'Mandaianum' (introduced by W. A. Manda of South Orange, N.J.), with a yellowish stripe down the center of each leaf. In another form, it is the margins that are white or yellow; usually cv. 'Variegatum' covers this, though other names are also to be met with in catalogues and literature. The varietal or cultivar epithets referring to various degrees of foliage-variegation have often been used with the generic name alone, as though they were names of species.

Chlorophytum gramineum (Baker) H. Perrier de la Bathie var. madagascariense (Baker) H. Perrier de la Bathie in Humbert, Flore de Madagascar et des Comores, 40e Famille: 64. 1938.

Chlorophytum madagascariense Baker, Journal of Botany 16: 326. 1878.

Rather similar to C. indicum in appearance, this is an endemic of Madagascar, as the name suggests. It has been listed recently by a European botanical garden.

Chlorophytum Heynei Baker, Journal of the Linnaean Society 15: 322. 1876.

Chlorophytum Heyneanum Wallich ex Hooker f., Flora of British India 6: 333. 1894; Wallich, Catalogue 5060, p. 177. 1831-32, nomen nudum.

A species of India and Ceylon, this has oblanceolate leaves 30-45 cm long and 25-35 mm. wide, with about 20-26 ribs, and tapering below to a broad channelled petiole 5-10 cm. long. The very short scape is less than 2.5 cm. long, the densely flowered raceme less than 8 cm. long, the small flowers exceeded by the narrow bracts. There are 6-8 seeds in each cell of the oblong, 10 mm. long capsule. Although cultivated to some extent in Europe, it seems not to be known here.

Chlorophytum Hoffmannii Engler, Botanische Jahrbücher... 34: 158. 1904.

This has broadly to narrowly lanceolate leaves with blades 8-20 cm. long, 2-3 cm. wide, with 18-22 ribs, gradually narrowed to channelled petioles a little more than half as long as the blades and about 6-8 mm. broad. The scape is about half as long as the leaves, the whole inflorescence a bit shorter than the leaves, the white flowers in scattered clusters along the rachis. The stamen filaments are papillose in their upper half. Native to Tanganyika, this species was introduced by Hoffmann and Scholz to the botanic garden at Berlin-Dahlem, where Engler reported that it had been thriving since 1898. A number of European botanical gardens list it, but it is not at present in the American trade.

Chlorophytum Huyghei De Wildeman, Annales du Musée du Congo, Botanique (Serie 5) 3: 55. 1909.

Although mentioned by Bailey, in the Standard Cyclopedia of Horticulture (1914), as appearing in the horticulture literature, we have no record of its being actually in cultivation anywhere today. However, it was considered by De Wildeman to be a very ornamental plant, with horticultural possibilities, and its reddish petioles might well make it so. It is a native of the Congo.

Chlorophytum indicum (Willdenow in Schultes and Schultes f.) Dress, comb. nov.

Ornithogalum indicum Willdenow in Schultes and Schultes f., C. Linné... Systema Vegetabilium 7: 535. 1829.

Phalangium indicum (Willdenow in Schultes and Schultes f.) Kunth, Enumeratio Plantarum... 4: 598. 1843.

Phalangium attenuatum Wight, Icones Plantarum Indiae Orientalis 6: 21, t. 2037. 1853.

Chlorophytum attenuatum (Wight) Baker, Journal of the Linnaean Society 15: 332. 1876.

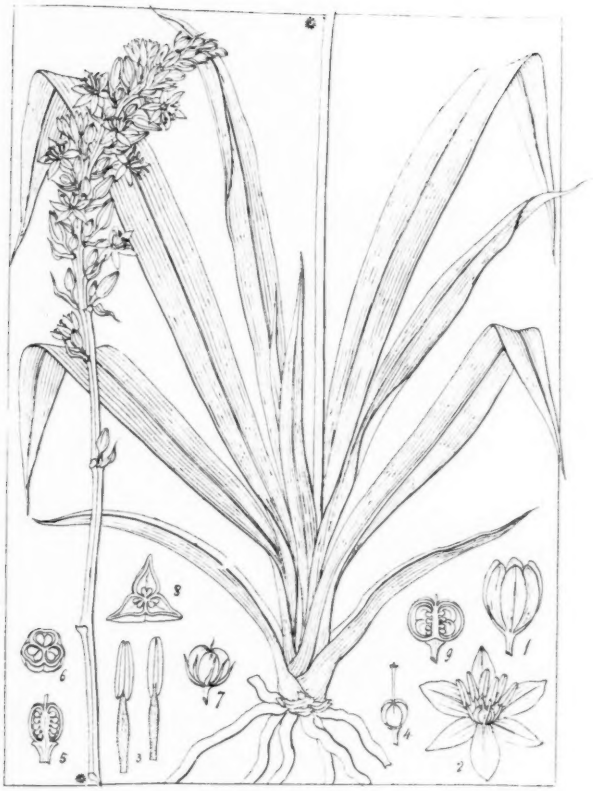


Fig. 19. Chlorophytum indicum. From Wright, Icones Plantarum Indiae Orientalis 6: pl. 2037. 1853 ("Phalangium attenuatum").

An Indian species, this is probably not cultivated in America, but listed occasionally in European gardens. The 10-18 leaves are linear, 25-45 cm. long and 25 mm. or less broad, merely narrowing somewhat toward the base but not truly petiolate. The ribs vary from 15 to 20. The scape is erect, about as long as the leaves, carrying a short raceme, 8-15 cm. long, of clusters of white flowers somewhat separated in the lower part of the raceme but densely placed in the upper. The capsule is about 8 mm. broad.

Although Chlorophytum attenuatum is the name that has been recognized and used for this species since Baker made this combination, it seems that the correct epithet should be indicum, if one follows J. D. Hooker's judgment in believing Chlorophytum attenuatum (Wight) Baker conspecific with Ornithogalum indicum. Although he adopted C. attenuatum as the valid name in the Flora of British India 6: 335, 1892, Hooker listed Ornithogalum indicum Roem. f. Syst. vii. 535 as a synonym, and said of C. attenuatum, "That this is Roemer's Ornith. indicum is proved by a specimen from Heyne in Herb. Rottler (now at Kew) marked as from Condapilly, which is the authority for the name (misspelt Cardapilly) and collector given by Heyne. "[In the Systema Vegetabilium, the name was actually published with Willdenow as the authority - "O. indicum Willd." - and the short description ended with the words "Reliqu. Willd. Ms.," indicating that the name and description were Willdenow's, taken from previously unpublished manuscript. "Cardapilly" and "Heyne" were mentioned in reference to herbarium material forming the basis of the species described.] In the absence of further published studies of the Indian species, and trusting to Hooker's conclusions, it seems that one must take up the epithet indicum as the oldest available one for this species.

Chlorophytum inornatum Ker-Gawler, Curtis's Botanical Magazine 27: t. 1071. 1808.

This is the type species, the basis on which Ker-Gawler founded his new genus Chlorophytum. The oblong-lanceolate leaf-blades are 15-20 cm. long by 25-40 mm. wide, 12-16-ribbed, narrowed gradually at the base to a distinct petiole 8-10 cm. long. The slender scape is 15-30 cm. long, with a greenish-flowered raceme 15-20 cm. long, simple or forked near the base. The globular capsule, 6 mm. long, has 5-6 seeds per cell. Although Ker-Gawler reported, at second hand, that this species was supposed to have come to England some years previously from the West Indies, it is actually a native of West Tropical Africa. Several European botanical gardens list it currently.

Fig. 20. Chlorophytum inornatum. From Curtis's Botanical Magazine 25: pl. 1071. 1807.

Chlorophytum laxum R. Brown forma javanicum (Hasskarl) Backer, Handboek voor de flora van Java 3L 52. 1924.

Nolina ? javanicum Hasskarl, in Van de Hoeven & De Vriese, Tijdschrift voor Natuurlijke Geschiedenis en Physiologie 10: 247. 1843.

Although seed of this was available in the nineteen-thirties from the botanical garden at Buitenzorg, Java, it is unlikely that it is being grown in this country. The species of which this is a form has a wide distribution, including tropical Africa, India, the East Indies, and tropical Australia.

Chlorophytum macrophyllum (A. Richard) Ascherson ex Baker, Journal of the Linnaean Society 15: 323. 1876.

Anthericum macrophyllum A. Richard, Tentamen Florae Abyssinicae 2 (Voyage en Abyssinie, pt. 3, vol. 5): 334. 1851.
Chlorophytum macrophyllum Ascherson in Schweinfurth, Beitrag zur Flora Aethiopiens 294, 1867, nomen nudum.

This species is widely distributed naturally in damp forests in tropical Africa, having been collected in Guinea, Angola, Ethiopia, Tanganyika, and regions between, and is accordingly somewhat variable. The 4-10 lanceolate leaves are 30-40-nerved and from 25-75 cm. long and from 2.5-8 cm. wide, thus well meriting the specific epithet. The blades are narrowed below to a somewhat petiolate base 5-30 cm. long, 10-18 mm. wide, but cannot be considered to have a definite petiole. The erect scape is 10-35 cm. long, terminating in a simple or basally 1-3-branched raceme up to 40 cm. long or occasionally longer, the small clusters of white flowers rather distant in the lower part of the axis but densely arranged in the upper part. The ellipsoid capsule is 5-9 mm. long. Only one American commercial source has listed this recently, but at least 16 botanical gardens of Europe have been offering seed of it.

Chlorophytum Mannii Baker in Thiselton-Dyer, Flora of Tropical Africa 7: 498. 1898.

From the published description alone, it is difficult to distinguish this species clearly from several others. The oblong-lanceolate leaf-blades are acuminate, rather rounded at the base, 3.5-4 cm. wide below the middle and 15-20 cm. long, with petioles of about the same length. The simple, lax inflorescence is 3-4 dm. long, bearing greenish-white flowers 4 mm. long on pedicels jointed near the apex. Native to tropical west Africa.

Fig. 21. Chlorophytum orchidastrum. From Edwards's Botanical Register 10: pl. 813. 1824.

Chlorophytum Seretii De Wildeman, Annales du Musée du Congo, Botanique (Série 5) 3: 56. 1909.

Listed only recently in Europe, this species rather resembles C. orchidastrum, seeming to differ, perhaps, in the proportionately broader or more abruptly acuminate leaf-blades and less branched inflorescence, if one is to judge by the illustration of the type plant. The latter was collected in 1906 near Gumbari, in the Congo.

Chlorophytum nepalense (Lindley) Baker, Journal of the Linnaean Society 15: 330. 1876.

Phalangium nepalense Lindley. Transactions of the Horticultural Society of London 6: 276. 1826.

Chlorophytum undulatum Wallich ex Hooker f., Flora of British India 6: 335. 1894; Wallich, Catalogue 5059, p. 177. 1831-32, nomen nudum.

Seeds have been listed for exchange by European botanical gardens in recent years under both names, C. nepalense and C. undulatum. The several leaves are linear-lanceolate, acute, narrowed toward the base but not petioled, 1.5 to 5 dm. long and 6 to 18 mm. broad, light green above and glaucous below, many-nerved. The inflorescence is 3-10 dm. long, branching, with largish white flowers on pedicels jointed at or below the middle. According to C. S. Kunth, there are 8 ovules in each locule of the ovary, but Hooker (in Flora of Br. India) describes the cells of the capsule as 2-3-seeded. This species comes from Nepal and Sikkim.

Chlorophytum orchidastrum Lindley, in Edwards's Botanical Register 10: t. 813. 1824.

The 6-9 spreading leaves are 14-24-nerved, with glossy oblong- to ovate-lanceolate blades 20-25 cm. long, 5-8 cm. broad, the margins somewhat undulate and tapering gradually to well defined channelled petioles 12-25 cm. long and about 10 mm. broad. The stiffly erect scape is about 30-40 cm. long, with one broad leaf-like bract below the middle and reduced, linear-lanceolate ones above; the inflorescence itself is paniculate, composed of several slender, stiffly ascending racemose branches 25-40 cm. long, with spaced clusters of small nodding greenish flowers with reflexing perianth segments, opening in the afternoon. The filaments are noticeably papillose in the upper half. The capsule is broader than long, about 4-6 mm. long, 8 mm. in diameter. This is an attractive foliage plant, not unlike one of the smaller-leaved species of Hosta in vegetative aspect. It has been listed only once or twice in this country, but is widely grown in European botanical collections. The plant on which the original description was based was collected in Sierra Leone and sent to England in 1822 by George Don.

Chlorophytum orchidastrum has a broad geographical distribution also, having been reported from (French) Guinea to the Cameroon, and also in Tanganyika, in tropical Africa. It is supposed to be native also in the Indian peninsula, but J. D. Hooker's description of the plant under this name, in his Flora of British India 6: 336, 1892, differs in some characteristics from the species as described by Lindley and Baker.

Chlorophytum sparsiflorum Baker, Journal of the Linnaean Society 15: 325. 1876.

The lanceolate leaves are very thin, with blades up to 20 cm. long and 3-4 cm. wide, 12-16-ribbed and narrowed gradually to slender petioles 10-20 cm. long. The scape is about 15-20 cm. high, bearing a single or basally one-branched slender raceme of widely spaced groups of greenish-white flowers. The entire axis of the inflorescence is minutely scabrid-pubescent. Capsules are globose. This is native from the Ivory Coast to Fernando Po. Apparently not available in this country, it is grown in at least two European collections.

Chlorophytum togoense Engler, Botanische Jahrbücher ... 32: 92. 1902.

Another species listed only recently is the Tanganyikan C. togoense. Leaf-blades are lanceolate, 10-12-nerved, 12-22 cm. long, 1.5-2.5 cm. broad in the lower third, sharp-pointed, and narrowed below rather abruptly to a petiole 8-22 cm. long. The inflorescence is simple or few-branched, lax, bearing small white flowers about 4 mm. long on pedicels jointed above the middle. Capsules are 4 mm. long, 6 mm. broad.

Chlorophytum ukambense Baker, in Thiselton-Dyer, Flora of Tropical Africa 7: 504. 1898.

This species has oblong-lanceolate leaves 12-15 cm. long and up to 3 cm. wide, without distinct petioles but broadest at the middle and narrowed gradually to the base and apex. The scape is shorter than the leaves and carries about 3 open racemes of greenish flowers. This native of east Africa is listed in the collections of five European botanical gardens but is probably not grown here.

Chlorophytum usambarense Engler, in von Poellnitz, Portugaliae Acta Biologica, Série B, 1: 347. 1946.

The numerous leaves of this are lanceolate, 10-18-nerved, 17-45 cm. long overall, with blades 10-26 cm. long and 12-35 mm. wide, narrowed below to long petioles 5-20 cm. long and 2-4 mm. broad. Both leaves and the bracts of the inflorescence are usually papillose on the margins. The inflorescence is racemose or paniculate, with an erect scape 8-22 cm. long, the flower-bearing portion 15-50 cm. long, with very long internodes, the lower of which are 3-7 cm. long. The pedicels are jointed at or above the middle. The white perianth-segments are 4-5 mm. long, the filaments longer than the anthers. The capsule is 4-6 mm. long. This species is a native of the Usambara and Uluguru Mountains of eastern Tanganyika.

Book Reviews

Anatomy of the Monocotyledons, I. Gramineae, by C. R. Metcalfe lxi - 731 pp., with 29 figs. Clarendon Press, Oxford. 1960. $13.45.

Since the publication in 1950 of Anatomy of the Dicotyledons by Metcalfe and Chalk, the botanical world has been waiting for a similar comprehensive treatment of the monocotyledons. The first installment of such a reference work is Dr. Metcalfe's latest monumental effort dealing exclusively with the grass family. It is a dictionary of grass anatomy which endeavors to give the reader some practical knowledge concerning the systematic anatomy of the vegetative organs of the grass family, and to let him know in what genera he may find any particular character or combination of characters. Dr. Metcalfe treats 345 genera of grasses; of these, 206 genera and 413 species have been examined by him, with the remainder of the taxa represented by siftings from the literature. Although the author is an anatomist and not a taxonomist he acknowledges invaluable advice on grass taxonomy from the expert agrostologists, Mr. C. E. Hubbard and Dr. N. L. Bor.

The book is organized into several sections. The first section, pages xv - lxi, serves to introduce the subject matter and to acquaint the reader with the general morphology of the grass plant, diagnostic microscopical characters, leaf structures and taxonomy of grasses, and selection and preparation of material.

The main body of this work (pages 1-585 and 651-654) is the systematic treatment of the genera and species. Since there seems to be no adequate taxonomic arrangement for the Gramineae, the author has chosen to list the genera in alphabetical sequence, with the genera not in the bamboo tribe first, followed in alphabetical sequence by genera of Bambuseae. The anatomical data follow a uniform plan of presentation using a standardized terminology and references to numerous illustrations, making a convenient and consistent arrangement throughout the text. This plan includes diagnostic generic characters (anatomical, of course) and characteristics of each species examined, both for the abaxial epidermis and for a transverse section of the lamina; specific structures are always considered for both. For example, such cell types and tissues as sclerenchyma, mesophyll, bulliform cells, and bundle sheaths are described under transverse section of the lamina, and where applicable, references are made to appropriate illustrations. Where material has permitted, information is given about culm, rhizome, and roots. For every taxon, the author states whether fresh or herbarium material was used, and if fresh, whether cultivated at Kew or obtained from its native country.

The author acknowledges that it would be helpful if it were possible to include keys to genera and species, based on anatomical characters, but since that is impossible, he has included about 15 tables listing species in which certain cell types and tissues occur (pages 590-629). If one wishes to know in which species there occur macro-hairs of various types, stomata with parallel-sided subsidiary cells, or vascular bundles of the Leptaspis type, one consults the list of species under the appropriate heading.

The book concludes with a bibliography of 538 entries, 29 figures drawn by the author, and an index.

The true value of this volume will be proved with time, since the scope of the book is so great and the Gramineae so numerous. Constant appeals are made in opening pages of the work for further study and collaboration between anatomist and agrostologist, in hope that anatomy and external gross morphology may be correlated and used in determining affinities between genera and groups of genera of grasses. The author warns of the variations one may find within a genus, and that it was possible to examine only limited amounts of material of any one particular species. Much research on grass anatomy and taxonomy is still to be done and integrated with the information incorporated in this work. However, for the agrostologist, this may well be the most important volume published in 1960.

The format is pleasing, and essentially the same as that used in Anatomy of the Dicotyledons. The print is clear, and the consistent use of varied type faces for headings, terms, and plant names makes this a readily readable book. For the average American, who dislikes Roman numerals, it seems that there has been an excessive use of them, as through the introductory pages, when Arabic numerals would have sufficed. When Roman numerals are used so extensively, proofreading must be especially painstaking; figure XVIII bears the caption Fig. XVII.

J. I.

ERRATA, VOLUME 8 (1960)

Page 13, line 20: for "course of confusion" read "source of confusion."

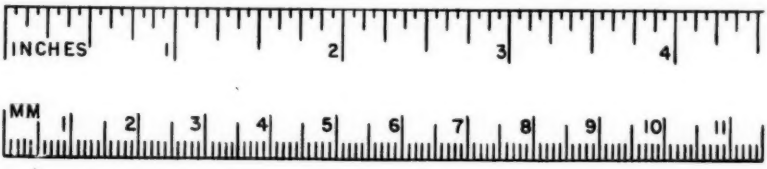
Page 26, line 34: for "S. quitonense" read "S. quitoense."

Page 77, line 6: for "Plant Introduction no. 1243893" read "Plant Introduction no. 243893."

Page 133, line 5: for "Xelem" read "Xerem."

ABBREVIATIONS USED IN BAILEYA

ann.	annual	dm.	decimeter	lf.	leaf
bien.	biennial	fl.	flower	lft.	leaflet
br.	branch	fls.	flowers	lvs.	leaves
brt.	branchlet	flt.	floret	mm.	millimeter
caps.	capsule	fr.	fruit	per.	perennial
cl.	clone	ft.	foot	segm.	segment
cm.	centimeter	hort.	horticultural	st.	stem
cv.	cultivar	in.	inch	sts.	stems
diam.	diameter	infl.	inflorescence	var.	variety

METRIC - ENGLISH EQUIVALENTS (approximate)

6 mm. - 1/4 in.	10 cm. - 4 in.	10 mm. - 1 cm.
12 mm. - 1/2 in.	1 dm. - 4 in.	10 cm. - 1 dm.
25 mm. - 1 in.	3 dm. - 1 ft.	10 dm. - 1 meter
2.5 cm. - 1 in.	10 dm. - 1 yd.	
5 cm. - 2 in.	1 m. - 39 in.